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Published by the Yorkshire Naturalists' Union

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# A LIFETIME WITH WASPS (HYMENOPTERA: VESPINAE)

MICHAEL E. ARCHER

*Presidential address presented to the Yorkshire Naturalists' Union at Harrogate, 6th December, 1997*

Becoming your President is a great honour which crowns thirty years of service to the Union. My main expertise lies with the vespine social wasps, so I take this opportunity to review some of my work with them.

## TAXONOMY

The Vespinae consist of the three groups: nocturnal hornets (*Provespa*), hornets (*Vespa*), and social wasps or yellowjackets (*Vespula, Dolichovespula, Paravespula*). *Vespula* and *Paravespula* often are combined together as one genus, *Vespula*.

The nocturnal hornets consist of three species and are confined to the tropics of eastern Asia.

Hornets are mostly distributed throughout southern and south-eastern Asia, with two species, *V. crabro* Linn. and *V. orientalis* Linn., extending into Europe and *V. orientalis* into north Africa. *V. crabro* has been introduced into north America. Although *Vespa* Linn., 1758 has long been recognised as a distinct taxonomic group and given the rank of genus since 1869 (Edwards, 1980), a review of the number of species has not been carried out since du Buysson (1904, 1905). My review (Archer, 1991) recognised 23 species, established three new synonyms, and split three species into six species. One of the splittings, *V. tropica* (Linn.) and *V. ducalis* Smith, was based on specimens sent to me from the New Territories, Hong Kong. These two colour forms, although distinct, were sympatric, so could be considered as separate species. Later these two species were found to be sympatric throughout Vietnam and southern China.

The social wasps, or yellowjackets, are widespread throughout the northern hemisphere, and several species have been introduced into parts of the southern hemisphere. Again a review of world species had not been carried out since du Buysson. My review (Archer, 1989) recognised 38 species, of which eight were new species.

Thus the Vespinae was found to consist of 64 species. A key to these species was published in 1989.

## Life Histories

The usual description of the life history of *Paravespula vulgaris* (Linn.) in England starts with the emergence of the over-wintered fertilised queens during March and April. These queens feed up to mature their ovaries and initiate their nests, usually built in underground cavities, probably by the end of April. The queen rears the first workers that emerge as adults from early June. The workers build combs of small cells (small cell nest) and rear further workers so that the colony greatly increases in size. From about mid-August the workers start to build large cells (large cell nest) in which the queens, and sometimes a few males, are reared. Many males are reared in the small cells. The sexuals, which emerge from early September, disperse from the colonies and mate. The males then die and the fertilised queens enter over-wintering sites. The colony starts to decline and is dead usually from early October. Such a life history can be called the 'foundress colony' life history.

I have found that other life histories are possible (Fig. 1). Queen colonies can be orphaned by the loss of their queens. The queen can be taken by predators when foraging, or die from disease, poor weather or just poor physiological condition. Some queens lose their nests from parasite attack, destruction from small mammals or the flooding of their underground cavities. The orphan colonies may be adopted by queens that have lost their nests, thus leading to the 'orphaned derived' life history.

A queen may attempt to take over the nest of another queen (Archer, 1985). If the usurping queen is successful then the 'usurpation' life history occurs. Few people have observed the fights between queens, whose dead bodies are usually found beneath the nest; up to 12 dead bodies have been found. Sometimes both queens involved in the fight are killed, leaving the queen colony orphaned.

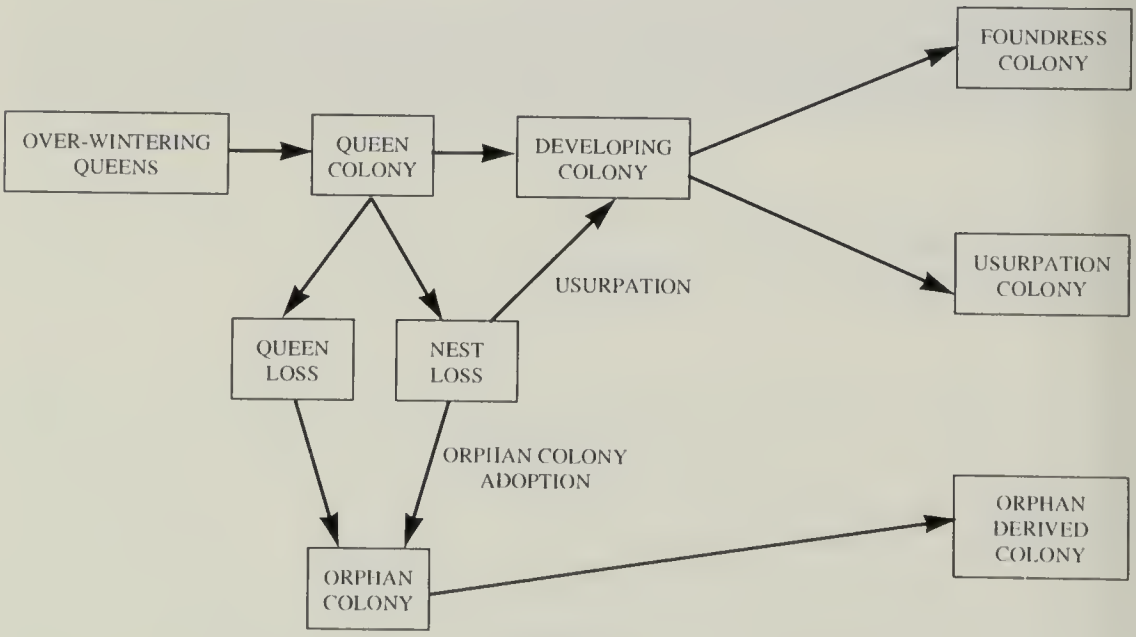


FIGURE 1
The three types of life histories of *Paravespula vulgaris*.

The relative importance of the three types of life histories is unknown, although in one study of *P. maculifrons* (du Buysson) a minimum of 30% of the queen colonies were successfully usurped (MacDonald & Matthews, 1981). In another study a queen nest, used as a decoy, attracted 56 queens (Cottam, 1948).

The question now arises as to whether there are two types of spring queen, of which the first would establish a colony by the foundress foundation process and the second by usurpation or orphan nest adoption. Martin (1990a), working with *Vespa simillima* in southern Japan, found that usurped colonies were often unsuccessful in rearing sexuals, or if successful in rearing sexuals, including queens, then the usurped colonies had smaller mature colonies than non-usurped colonies, and thus reared fewer sexuals. This kind of evidence indicates that there are unlikely to be two types of spring queen, only the foundress foundation type. If a foundress loses her nest then she resorts, as a second-best strategy, to usurp or orphan-adopt another nest, probably because there is too little time left to establish a second nest and bring it to maturity.

I have discovered that most queens die before they can establish a colony and rear sexuals. Well over 90% of queens of *P. vulgaris* die when over-wintering (Archer, 1984). Of the queens that emerge in the spring 92% fail to establish colonies and rear sexuals. A further 2.2% establish colonies that eventually rear males, but not queens. Thus only 5.8% of spring queens succeed in establishing colonies that rear both males and queens.

Little is known about the enormous mortality of the queens during the winter and spring. The high lipid content of the over-wintering queens (40% of dry body weight in *P. vulgaris*) would make them very attractive as a source of food to small mammals and fungi. In the spring many queens are of 'poor quality', being characterised by a weakness of flight, a lack of nest building, and poor attention to the brood. Such queens usually disappear, so creating orphan nests. Fighting between spring queens could also lead to a large queen mortality.

Some developing colonies are characterised by the appearance of many 'brood irregularities'. Normally a comb consists of rings of the brood stages of eggs, larvae and sealed brood. Workers will destroy larvae and sealed brood. Thus among the sealed brood and larvae, empty cells may be present, or cells with an earlier brood stage. Such cells are called 'brood irregularities' (Archer, 1981a). Colonies developing many brood irregularities usually fail, although colonies developing brood irregularities from mid-July until August have been known to recover and rear sexuals.

The cause of brood destruction by workers is one of the great problems of social wasp biology. It could simply be the occurrence of low external temperatures which reduces foraging activities: in these circumstances the brood would be used as a food source, or the brood destruction could be a consequence of a breakdown of the way in which the colony organises itself, a process which is little understood. However, worker-queen conflict could be a consequence of successful queen usurpation. In these circumstances the current brood of the usurper queen would not be genetically related to the workers, which would be the offspring of the previous foundress queen. If the workers could recognise that the brood were not their sisters, then the workers could refuse to rear them and so destroy them!

A life table, which shows the survival rate of each phase of the life history, can be used to compare differences in the life histories of successful colonies of *P. vulgaris* and *D. sylvestris*. Mortality loss of autumn and spring queens (with the small cell nest) are similar for both species. The mortality loss of the large cell nest is much larger for *P. vulgaris* (36.4%) than for *D. sylvestris* (4.2%) even though an average colony of *P. vulgaris* produces many more autumn queens (962) than *D. sylvestris* (252). Reasons for these differences will be considered later.

## Colonial Development

The development of a colony can be described by three types of data: (1) Colonial characteristics, i.e. the number of cells, brood stages, and adults. At the end of the larval development the gut is opened anally and waste products deposited at the bottom of the cell

as a meconium. Counting these meconia can give a first estimate of the number of adults produced by a colony. The rate of the development of a colony will depend upon (2) developmental parameters: i.e. rates of cell building, the production of each brood stage, the adult production of each caste, and the mortality rates of each brood stage and adult workers, and (3) the length of life characteristics, e.g. lengths of the life of each brood stage, of the workers and of the colony itself.

It is difficult to get these data under natural conditions because the nest contents are covered by envelopes, the colonies are often underground and the wasps are aggressive when their nests are investigated.

A second approach is to collect colonies throughout the year and make counts of colonial characteristics and then use laboratory colonies to determine the length of life characteristics. From the colonial and length of life characteristics, estimates can be made of the developmental parameters. To test the accuracy of the estimates of the length of life characteristics and developmental parameters, a simulation model can be produced based upon these estimates and the numerical output of the model compared with the field data (colonial characteristics) for goodness of fit.

If the fit is unsatisfactory, justified changes are made to the length of life characteristics and developmental parameters until a satisfactory fit is achieved. The great complexity of the model (about 250 parameters and variables) gives confidence in this process, by greatly restricting the number of possible solutions. A model has been produced for *P. vulgaris* (based on the analysis of 198 colonies) and *D. sylvestris* (based on 55 colonies) (Archer, 1981b).

Output data from the models can be used to show differences between *P. vulgaris* and *D. sylvestris*. The data given earlier in the life tables showing differences between the two species in queen production were not available previously until the models were developed. Can reasons be found for these differences?

The types of data, e.g. number of queens produced, length of colonial cycle, used to describe colonial development can be considered as life history traits. The sum of life history traits defines a life history strategy, which functions to solve the problems of maximising colonial survival and reproduction in given ecological conditions and phylogenetic constraints (Stearns, 1992).

The life history traits of *D. sylvestris* are that there is a shorter colonial cycle from worker emergence (less than three months); a smaller mature nest size (mean 940 cells); an earlier start to large cell building and queen rearing (end of June). At the end of June worker duties in building large cells (0.35 cell per worker per day) and tending larvae (2-3 larvae per worker) are larger. By contrast, the life history traits of *P. vulgaris* are that it has a longer colonial cycle from worker emergence (four months); a larger mature nest size (mean 9700 cells); a later start to large cell building and queen rearing (middle of August) when workers duties in building large cells (0.04 cell per worker per day) and tending larvae ( 1-2 larvae per worker) are smaller.

Although the working conditions for workers of *D. sylvestris* within the colony during queen rearing are less favourable, these occur during the summer when external conditions and resources, e.g. higher temperatures and food supply, are more predictably favourable. A further benefit of the more predictably favourable conditions and resources, as previously noted, is the very much reduced chance of colonial mortality during the large nest phase. This is at the cost of a smaller queen production. Such a life history strategy may be called a 'summer advantage strategy'.

In contrast, the working conditions for workers of *P. vulgaris* within the colony during queen rearing are more favourable, but the external conditions during the late summer and autumn are less predictably favourable. Thus the cost of the less predictable external conditions, with their increased chance of colonial mortality, is balanced by the benefit of a greater queen production of the surviving colonies, as previously noted. Such a life history strategy may be called a 'large colonial size strategy'.

The efficiency of the queen production for the above two species can be measured in two

ways: (1) The number of queens produced per day (for a year unit) is 2.6 for *P. vulgaris* and 0.7 for *D. sylvestris*. This reflects the greater output of queens by *P. vulgaris*. However, if the efficiency is expressed in terms of the number of workers necessary to rear a queen, then *D. sylvestris* at 1.3 workers is more efficient than the 10.7 workers needed by *P. vulgaris*.

During the development of a colony it is important to know when is the optimal time to switch from small cell building and worker rearing to large cell building and queen rearing. The answer to this question depends on the need to maintain a balance between the number of favourable days left in which to rear queens and the number of days needed to build up a sufficient worker force to rear the queen larvae. Lovgren (1958) predicted that the smaller the number of workers reared after queen production had started, the more precise would be the starting date for queen rearing. Relatively fewer workers are reared after queen production starts for *D. sylvestris* compared with *P. vulgaris*, so the switching date for *D. sylvestris* should be set more precisely.

The simulation model can be used to investigate the switching-date problem for the start of queen rearing. As the switching date is delayed, when running the model, queen production decreases. While the rate of decline for *P. vulgaris* is relatively constant, the model shows an accelerated decline for *D. sylvestris*. Clearly the switching date is more critical for *D. sylvestris*. The switching date for *D. sylvestris* (day 22) is before the accelerated decline in queen production begins. According to the model if the switching date (day 75) for *P. vulgaris* were earlier, queen production would be increased. However, before day 75, the larva load per worker would seem to be too large for queen rearing to begin.

One implication of the relatively smaller production of workers after queen rearing begins for *D. sylvestris* is that the workers should live relatively longer, to oversee the rearing of the sexual brood. Although there is no data on the length of life of the workers of *D. sylvestris*, the model predicts they should live for 9-18 days. This is longer than the length of worker life for *P. vulgaris* (6-12 days), for which there is laboratory-derived data support. It is interesting to note that the workers of *D. sylvestris* are heavier than those of *P. vulgaris*. It is likely that heavier workers live longer lives.

## Population Dynamics

During my four year study of colonies at my study site of 151 ha. at Sand Hutton in North Yorkshire, I found that the numbers of *P. vulgaris* varied greatly from year to year. There was a 10-fold difference in the number of colonies, a 43-fold difference in the total queen production for the study area, and a 100-fold difference in the mean number of queens produced per colony per year (Archer, 1984).

The great variation of yearly abundance has been casually noted from early times (Bree, 1849). From casual observations Beirne (1944) noted that during the 68 years from 1864 until 1931 there had been ten years of summer abundance and ten years of summer scarcity of wasps. Fox-Wilson (1946) at the Royal Horticultural Society's gardens at Wisley noted a 42-fold (range 2-84) in colony numbers during 29 years (1921-1949).

A problem with Fox-Wilson's data is that it refers to five species, although most colony counts refer to *P. vulgaris, P. germanica* (Fabricius) and *Vespula rufa* (Linnaeus). A more recent set of Wisley data over 20 years (1977-1996) shows that colonies of *P. vulgaris* were much more common than those of *P. germanica* and *V. rufa* (A. J. Halsted, per. comm.).

Both Beirne (1944) and Fox-Wilson (1946) attempted to explain the yearly variation in terms of the variation of spring rainfall. This spring rainfall control hypothesis was based upon visual inspection of histograms. A statistical examination of the data failed to confirm the hypothesis (Archer, 1985).

In my own work during nine years (1969-1977) I examined 152 mature colonies of *P. vulgaris*, collected from the city of York and its immediate surroundings. Colonies were classified as successful (producing many queens) or unsuccessful (producing no or very few queens), and were graded on a three point scale of large, medium and small with

respect to nest size. In addition, the abundances of summer wasps from 1968 until 1977 were graded on a three point scale: abundant, average, scarce. No relationship was found between spring rainfall and summer wasp abundance, colony size, or colony success. No relationship was found between summer weather and either summer wasp abundance or colony size. A significant relationship was found between summer weather and colony success. Successful colonies were more frequent during summers with above average (or median) weather and unsuccessful colonies were more frequent during summers of below average weather. This relationship is called the summer weather effect.

It was found that larger successful colonies always used a greater percentage (70%-90%) of their large cells to rear sexuals while smaller successful colonies varied greatly in the percentage (30%-90%) use of large cells to rear sexuals. This difference between the larger and smaller successful colonies probably was related to the uncertainty of favourable weather during September and October when sexual rearing occurred. A larger colony would be better able to control the temperature of the colony at about 30°C, and hence would be better able to continue rearing brood when ambient temperatures were low. This relationship may be called the autumn weather effect.

Both Bree (1849) and Beirne (1944) noted that scarce and abundant years were often associated in pairs, and that an abundant flight of queens in the spring was followed by a scarcity of workers in the summer and vice-versa. I was sent the social wasps from a Malaise trap operated by Owen (1978). For both *P. vulgaris* and *P germanica* the most abundant and scarce wasp years as measured by the number of workers trapped, occurred in pairs. It was also found that the year that was most abundant for spring queens had the fewest workers and vice-versa. Combinations of large numbers of spring queens and summer workers in any given year did not occur, although values of fewer queens and workers were often present.

I then realised that the Fox-Wilson's data had an underlying pattern: a plot of DN against $N_t$ ($N_t$ = nest count in the current year, $DN = N_{t-1}-N_t$) gave a statistically significant correlation coefficient ($r = -0.84$, $p<0.001$) and a negative regression slope (–1.41). This analysis indicated the pattern was one of a strong 2-year cycle with a damped waveform, which was confirmed by the data from the Leicester Malaise trap, and from data received from agricultural research stations (Hereford, Harpenden, Ascot) where suction traps collected *P. vulgaris* and *P germanica*.

Such a pattern indicated an endogenous mechanism which arose from some characteristic of the wasps themselves. I hypothesised that queen influence was the basis of the endogenous mechanism, particularly as it was found that variation in queen activity during the queen nest phase could be correlated with mature colony size.

Even if queen influence was shown to be the basis of the endogenous mechanism, it was still necessary to link queen influence to the 2-year cycle. This was done as follows. Queen influence was represented in terms of colony success and the 2-year cycle as a decreasing or increasing year concept. A decreasing year indicated that summer wasp abundance in the current year was less than the previous year while an increasing year indicated that summer wasp abundance in the current year was more than the previous year. It was found the decreasing years had relatively more unsuccessful colonies while increasing years had relatively more successful colonies than could be expected by chance. Also, small colonies were characteristic of decreasing years but not of increasing years.

Thus it seems that queens produced in increasing years are in some way destined to be more likely to produce small, unsuccessful colonies the following year, while queens produced in decreasing years are more likely not to produce small unsuccessful colonies. How might queens be so influenced?

Queens might be influenced during the spring via usurpation behaviour (Fig. 2). Following an increasing year spring queens would be numerous, resulting in high levels of usurpation attempts and consequent queen mortality. Even the successful usurping queens could be influenced by their fighting, so eventually heading small unsuccessful colonies. Following a decreasing year, the reverse would occur.

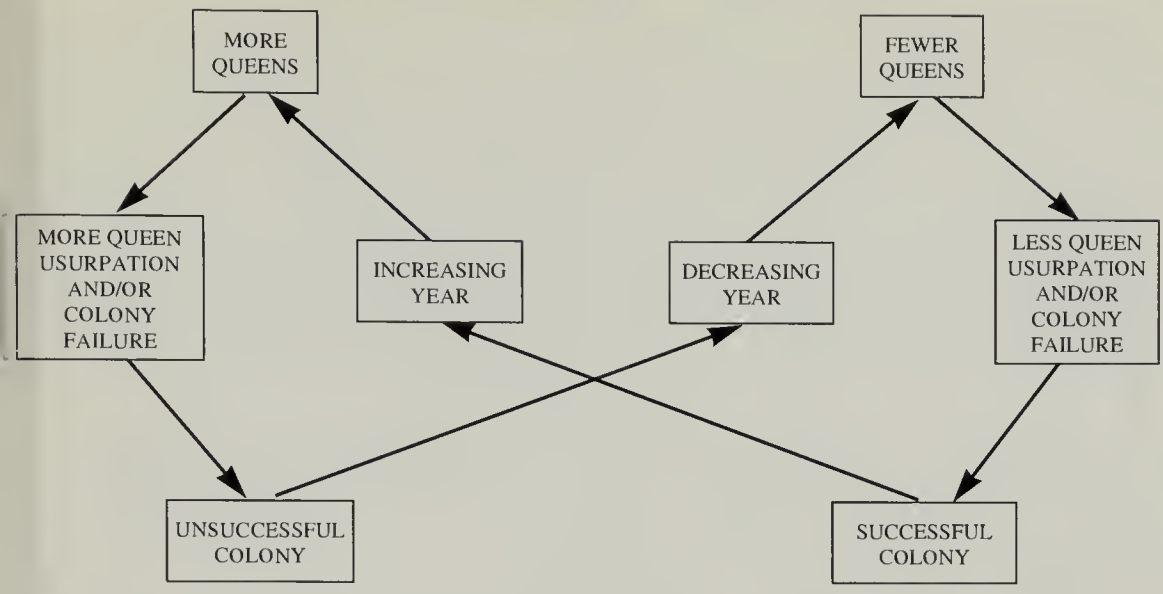


FIGURE 2
Endogenous mechanism of the two-year cycle of colony abundance of *Paravespula vulgaris*.

Again, the queens might be influenced during the autumn in which they are reared. Thus in decreasing years, particularly scarce years, when fewer queens would be reared, each queen would be better fed and of higher quality so that she eventually heads a large successful colony. In decreasing years, particularly abundant years, the reverse would occur.

Of course, the above two explanations may not be alternatives but reinforce each other. Thus successful usurpation would seem to be more likely against a colony headed by a poor quality queen.

Superimposed on the above endogenous mechanism are the exogenous weather mechanism of the summer and autumn weather effects. Below average summer and poor autumn weather would tend to reduce queen rearing, while summer weather above the average would tend to increase queen rearing. However these weather effects would seem to be subordinate to the endogenous mechanism in that the weather effects do not dominate the effects of the endogenous mechanism. It is highly likely that the weather effects could operate in conjunction with the endogenous mechanism to produce the unusually abundant and scarce wasp years that made the 2-year cycle so evident.

## Foraging Studies

The interactions of a colony with the outside environment can be studied via foraging behaviour. Foraging behaviour has been studied using underground colonies of *P. vulgaris*. An entrance-exit apparatus was placed over the burrow entrance of a colony (Archer, 1977).

Outgoing workers were usually either carrying earth particles (earth carriers) or their mandibles were empty (non-earth outgoers). Incoming workers were either carrying pulp (pulp carriers), flesh (flesh carriers), fluid (fluid carriers) or no load (empty incomers). Fluid carriers were further divided into workers with fully extended crops (full fluid carriers) or partially extended crops (partial fluid carriers). Examination of the fluid showed it mainly consisted of water and dissolved carbohydrates. Mixed loads were found. Thus 28% of pulp carriers were also partial fluid carriers, and 40% of flesh carriers carried a coloured crop fluid extracted from the prey during malaxation. The heaviest load recorded was that of a flesh carrier where the mandible and crop loads of 41.2 mg represented 73% of the fresh body weight of the worker.

The seasonal foraging activities of a successful colony will be given as an example. For outgoers (Fig. 3), the overall changes in foraging rates were a rapid increase during July

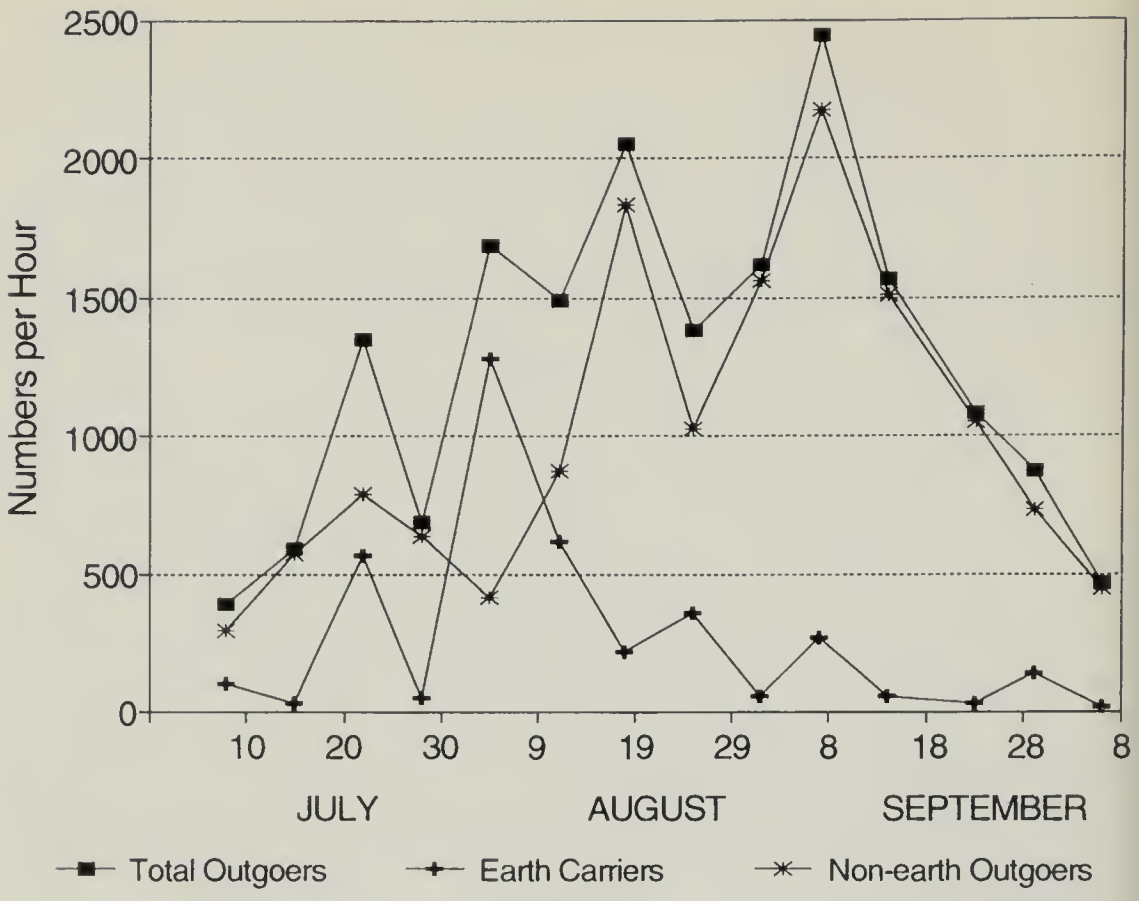


FIGURE 3
Seasonal outgoing foraging rates for a successful colony of *Paravespula vulgaris*.

and August, then foraging rates were relatively constant until early September when a rapid decline occurred. During July the earth carriers could be more numerous than the non-earth outgoers. From early August earth carriers were always less numerous than non-earth carriers, although with occasional increases in earth removal during August and September.

For incomers (Fig. 4) the overall changes in foraging rates were, not surprisingly, similar to those of outgoers. Usually the fluid carriers were the most numerous type of forager and the empty incomers the least numerous type. During July the pulp carriers tended to be more numerous than the flesh carriers, but during early August there was a change-over with the flesh carriers usually becoming more numerous than the pulp carriers.

An interpretation of above seasonal foraging pattern is as follows. During July the earth removal and pulp collection is to do with the enlargement of the earth cavity to accommodate the expanding small cell nest. By mid-August the small cell nest is completed so earth removal and pulp collection decreased. From mid-August, the building of the large cell nest begins. This results in further earth removal and flesh collection to feed the sexual larvae. The relative lack of pulp collection during this time may suggest that pulp from the small cells is re-used. In mature nests the walls of the small cells are often reduced in height indicating that the pulp of the walls might have been re-used.

An example of daily foraging, on the 30 August, will be given for a successful colony. Foraging activities were characterised by an early morning high rate, followed by a decrease by mid-morning. Later the rate increased, with a peak in the afternoon followed by an evening decline. As expected for this time of year, non-earth outgoers were more numerous than earth carriers, and flesh carriers were more numerous than pulp carriers.

Flesh carriers were particularly noticeable from mid-day onwards. The early morning high activity was related to an increased fluid collection. The dissolved carbohydrates of these fluids would replace a colony deficiency, so allowing an increase in the metabolism of the colony with a consequential rise in colony temperature (Martin, 1990b).

The estimates of the total number of foragers during 19 July, 4 and 30 August of a successful colony can now be considered (Table 1). The trends in the relative importance of each forager type agrees with the trends obeserved in the seasonal study. The total number of outgoers was always greater than the total number of incomers in these three daily studies. Although some of these differences between the number of outgoers and incomers was probably due to experimental error since the difference was consistently in the same direction, it is likely that the difference reflects forager mortality.

TABLE 1

The total number of each forager type during one day in the three daily studies.

| | Sand Hutton (1) 74 19th July | Pasture Wood 70 4th August | Pasture Wood 74 30th August |
|---|---|---|---|
| Earth Carriers | 25,509 | 19,946 | 10,146 |
| Non-earth Carriers | 2,950 | 6,891 | 75,474 |
| **TOTAL OUTGOERS** | **28,459** | **26,837** | **85,620** |
| Full Fluid Carriers | 6,237 | 5,045 | 5,886 |
| Partial Fluid Carriers | 9,908 | 10,855 | 50,537 |
| **Total Fluid Carriers** | **16,145** | **15,900** | **56,423** |
| **Pulp Carriers** | **8,556** | **6,283** | **5,646** |
| **Flesh Carriers** | **2,995** | **2,937** | **18,045** |
| **Empty Incomers** | **316** | **633** | **1,459** |
| **TOTAL INCOMERS** | **28,012** | **25,735** | **81,573** |

### Sex Ratio Investments

How should a colony proportion its resources between male and queen production? The answer to this needs to focus on the queen-worker conflict due to asymmetrical genetical relationships. Sex ratio investment is usually measured by determining the dry weight production of queens and males. In a colony with a singly-mated queen and no worker reproduction, it is expected that the queen will adjust the sex ratio investment to give equal dry weights of queens and males. This is because the queen's genetical investment in a son or daughter queen is the same. Workers will want to increase the investment in queens to three times that of males. This is because on average sisters (queens and workers) have three-quarters of their genes in common, while sisters and brothers have one-quarter in common. If the queen had mated with more than one male and/or there is worker reproduction, the sex ratio investment for the queen is unchanged, but the workers will increase their investment in the males, although investment in queens will still be greater.

Separate estimates of dry weights were made for males reared either in the small or large cells. Making these estimates was complicated by finding that crop fluids represented about one-third of the mean dry body weight. These fluids, which have a large carbohydrate content, probably provide a readily available source of energy needed by the males when flying around their mating circuits.

Estimates of the dry weights of queens was complicated by the large amount of lipids found mainly in the fat bodies. About 40% of the mean dry weight of queens consist of lipid substances, which act as a food store to enable the queen to over-winter.

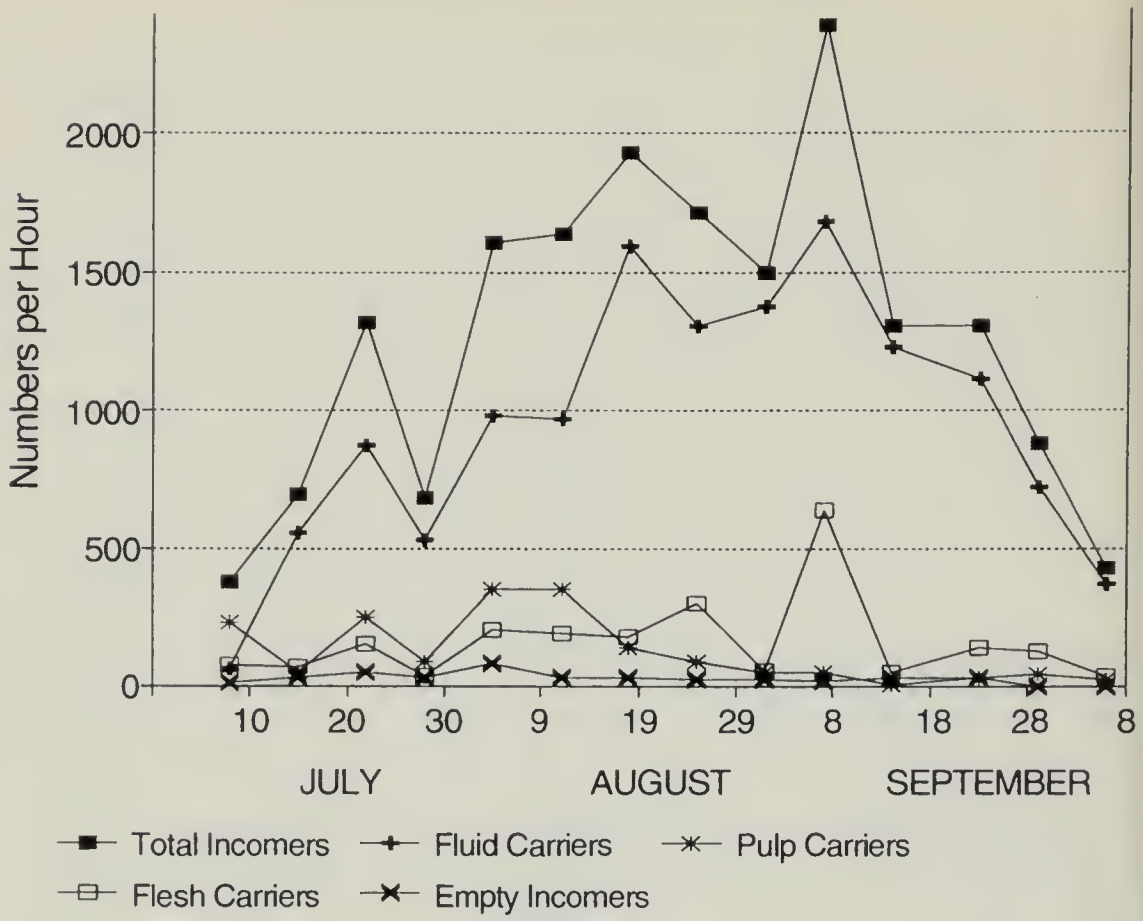


FIGURE 4
Seasonal incoming foraging rates for a successful colony of *Paravespula vulgaris*.

The simulation model also gave the best estimates of the number of males and queens produced by a successful colony.

Slightly more males than queens are reared, but, because queens are heavier, the sex ratio investment changes markedly in favour of the queens, with 0.62 dry weight male produced per dry weight queen. Because males are relatively more expensive to rear, since they have a higher metabolic rate than queens, the sex ratio investment needs to be adjusted by the energetic cost ratio. The sex ratio investment then becomes 0.72 dry weight male per dry weight queen, still showing an investment in favour of queens.

It was found from collected colonies that workers were destroying, on average, 45% of the male brood in the large cells. Small larvae and sealed brood also were neglected and destroyed in the latter part of colonial development. At this time the small cell brood is mainly male and the simulation model estimates that nearly 20% of small cell larval and sealed brood are neglected and destroyed.

The interpretation of the above observations and calculations is that the queen would seem to be laying relatively more male eggs than queen eggs so that the dry weight investment in adult queens and males will be equal. The workers would seem to destroying male brood so as to bias investment towards the queens. However, the sex ratio investment does not reach the ratio of three queens per male, probably because the queen undergoes multiple matings (Page, 1986).

Vespine wasps have provided me with an endless series of problems to be investigated, problems which are still being investigated both in my own researches and those of others.

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## BOOK REVIEWS

**Atlas of grasshoppers, crickets and allied insects in Britain and Ireland** by **E. C. M. Haes** and **P. T. Harding**. Pp. 61. Institute of Terrestrial Ecology research publication No. 11, Joint Nature Conservation Committee. 1997. £15.50 paperback.

The Orthoptera are a large and diverse order of insects with a world population of over 17,000 species. Within Western Europe the numbers drop dramatically to about 900 species, mainly found on the Iberian Peninsula. The native fauna of the British Isles is, unfortunately, very small indeed. The atlas contains specific distribution maps of some 31

grasshoppers and crickets, 3 native cockroaches and 4 earwigs. A coverage map for the naturalised stick-insects has been included, but there are none for individual species.

The number of species recorded from Yorkshire, according to the maps, drops to 15 grasshoppers and crickets and 2 earwigs. Several of these appear not to have been recorded for many years, such as the Mole cricket and the Slender ground-hopper, whilst others are very rare and restricted to a very few locations.

Like many such publications, the *Atlas* records the decline of our native fauna, but also helps to identify those species in need of special protection. Three species have been subject to the Species Recovery Programme operated by English Nature and one, the Mole cricket, is subject to further action under the UK Biodiversity Action Plan.

The *Atlas* provides a wealth of information and is a "must" for all naturalists interested in zoo-geography and the conservation of our native invertebrate fauna.

AN

**New Flora of the British Isles** by **Clive Stace**. Pp. xxx + 1130, with numerous line drawings and b/w plates. Cambridge University Press. 2nd edition. 1997. £28.95 plastic covered paperback.

A much revised edition of this innovative guide to our flora, the first edition of which was reviewed in *The Naturalist* **117**: 112 (1992). Remarkably, within its compass more than 4500 taxa are now covered. The most important changes are: the inclusion of about 320 additional taxa (129 fully treated at species level); superior printing, resulting in 96 fewer pages despite the increase in text; citation of chromosome numbers where known; standardization of authority abbreviations (Brummitt and Powell 1992); and the provision of a full index down to subspecies level. The latter, sadly lacking in the first edition (see *Naturalist* **121**: 40, 1996), makes this invaluable tool even more useful for the British naturalist.

MRDS

**Natural History in Wales** edited by **D. M. Spillards**. Pp. 53, with full colour plates. National Museums and Galleries of Wales, Cardiff. 1997. £5.95 paperback.

This booklet was published some three years after the opening of the re-designed galleries at the National Museum of Wales in Cardiff, which present and interpret some of the natural history of Wales. The illustrations are well selected and of high quality, as would be expected from the staff of a National Museum. The editor appears to have gone out of his way to ensure that simple words were found to explain complex issues. For example, only one Latin name is used throughout; it seems that no popular name could be found for the common dung fungus *Panaeolus semiovatus*. The text is over-simplified and tells the reader very little that is specific about the natural history of Wales.

With a simple bit of re-editing, this booklet could be used to illustrate several other areas of Britain, including Yorkshire. Personally, I would have liked the text to be more specific. The booklet reads as though the Museum was trying not to advertise, and wanted to keep the beauty and variety of the Welsh heritage to itself.

I have no doubt, however, that the general public, the market for whom this booklet was written, will find it interesting and informative.

AN

# LICHEN FLORA OF NORTHUMBERLAND: SUPPLEMENT 1

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Since the 'Northumberland Lichen Flora' was published (Gilbert 1980), no systematic work has been undertaken in the county. Sufficient casual records have accumulated however to make it worth issuing a first supplement. Thirty-six species are reported as new to Northumberland (marked with an asterisk) and two are removed from the list, which brings the total recorded for the two vice counties (67 & 68) to 620. A number are the result of recent taxonomic revisions, but the majority are a consequence of survey work south of the River Tyne. Nomenclature follows Purvis *et al.* (1993). HAMU = Herbarium, Hancock Museum, Newcastle-upon-Tyne; E = Herbarium, Royal Botanical Gardens Edinburgh. OLG and DEM refer to records made by the authors.

*Arthonia arthonioides* (Ach.) A. L. Smith North facing sandstone outcrop by Sweethope Lough, 35/89, 1983 B. J. Coppins.

**Bacidia beckhausii* Korber On ash by Wark Burn, 35/82.77., 1980 F. Rose (HAMU).

**B. viridifarinosa* Coppins & P. James Shaded bole of sycamore by Beldon Burn 35/98.51, 1991 DEM.

*Brigantiaea fuscolutea* (Dickson) R. Sant. Winch's records from the Cheviots are now regarded as highly unlikely, no sufficiently basic habitats occur. The species should be excluded.

*Buellia pulverea* Coppins & P. James Fence post on moorland, Beldon Shields, 35/94, 1992 DEM.

**B. uberior* Anzi On hard siliceous rocks, Harthope Valley, Cheviots, 36/92, 1970s (Purvis *et al.* 1992).

**Caloplaca dalmatica* (Massal.) H. Olivier Calcareous sandstone cliff by the Beldon Burn, Riddlehamhope, 35/94, 1991 DEM.

**C. lucifiga* Thor On ancient elm in front of The Hall, Hesleyside, 35/88, 1969 B. J. Coppins, F. Rose, D. L. Hawksworth & OLG. (E). (Thor 1988).

*C. obscurella* (Lahm ex Korber) Th. Fr. On sandstone rocks by the North Tyne at Warden Rocks near Hexham, 35/96,1996 OLG.

*Cetraria islandica* (L.) Ach. At edge of sandstone outcrop in heather moorland, Crockey's Heugh Debdon, near Rothbury, 46/052037, 1994 J. Steele.

*Chaenotheca chrysocephala* (Turner ex Ach.) Th. Fr. Bark fissures of large oak standing in pasture, Derwent Gorge, 45/04, 1997 DEM. This species is widespread on the Durham side of the river.

*Collema dichotomum* (With.) Coppins & Laundon On outcroping andesite in the River Coquet at Shillmoor, Cheviots, 36/80, 1996 OLG. On submerged sandstone ledges by the North Tyne at Warden Rocks near Hexham, 35/96, 1996 OLG.

*Cyphelium inquinans* (Sm.) Trevisan Fence posts near Bamburgh Castle 46/13, 1997 A. M. & B. J. Coppins.

**Dermatocarpon meiophyllizum* Vainio The specimen of *D. leptophyllum* from Warden Rocks near Hexham, 35/96, has been redetermined as this species by Alan Orange.

**Eiglera flavida* (Hepp) Hafellner Limestone pebble on shingle ridge, The Snook, Holy Island, 46/14, 1978 B. J. Coppins (E).

*Ephebe lanata* (L.) Vainio On Whin Sill, north side of Gilderdale Burn, 35/687466, 1981 R. W. M. Corner. Third record, all from the Whin Sill.

*Fuscidea lygaea* (Ach.) V. Wirth & Vezda On acid mine spoil, Beldon Shields, 35/94, 1991 DEM.

*F. praeruptorum* (Du Rietz & Magnusson) V. Wirth & Vezda Occasional on the vertical side of acid drystone walls, Harwood Shield, 35/95, 1997 DEM.

*Gyalecta ulmi (Swartz) Zahlbr.* One large thallus still present on limestone in the gorge at Yew Crags, West Allandale, 35/74, 1995 OLG. Following the ravages of Dutch Elm Disease this is the only site for the species in England.

**Ionaspis heteromorpha* (Krempelh.) Arnold On hard limestone boulder in Heathery Burn 35/90.49, 1992 DEM.

*Lasallia pustulata* (L.) Merat Now known in a dozen separate places on Shaftoe Crags and extending onto dry stone walls, 45/08, 1997 M. Cruise & E. Smith.

**Lecanactis premnea* (Ach.) Arnold Shaded boles of sycamore on banks of the River Allen, Plankey Mill, 35/76, 1990 DEM.

**Lecania rabenhorstii* (Hepp) Arnold On sandstone above high tide mark, St Mary's Island, Whitley Bay, 45/37, 1997 DEM.

**Lecanora aitema* (Ach.) Hepp Frequent on lignum in the uplands, occasional on pine trees. First record: on pines near Sweethope Loughs, 35/89,1994 DEM. Formerly included in *L. symmicta.*

*L. caesiosora* Poelt Frequent in the south-west of the county on the vertical sides of well-lit, acid stone walls. Burnt Ridge, 35/95,1985 DEM.

**L. farinaria* Borrer On several willows in Wilkwood and by Ramsey Burn, Otterburn Ranges, 36/80,1975 OLG. (E).

**L. horiza* (Ach.) Lindsay Hawthorn branch, Bellingham, 35/88, 1994 DEM. Fence rail, Lilswood Moor, 35/95, 1997 DEM. Probably overlooked as *L. chlarotera.*

**Lecidea auriculata* Th. Fr. On eroding, coarse-grained sandstone in walls, rare, Kings Law, 35/85,1997 DEM.

**L. diducens* Nyl. On acid rocks and walls in unburnt moorland, frequent in the south-west of the county. First record: wall at Baybridge, 35/59, 1994 DEM.

*L. hypnorum* Lib. On ash near Wark Burn, 35/82.77, 1980 F. Rose. Third record.

**L. isidiosa* Th. Fr. On fence posts near Bamburgh Castle, 46/13, 1997 A. M. & B. J. Coppins.

*L. plana* (Lahm) Nyl. Common on flat boulders in moorland and capstones of walls in the Allendale area of South Northumberland. OLG & DEM.

*L. pycnocarpa* (Korber) Ohlert Local in the uplands on damp walls and beside streams. Prefers flat surfaces. Beldon Shields 35/94 and Harwood Shield, 35/95, 1994 DEM.

**L. turgidula* Fr. On *Calluna* stem, Harwood Shield, 35/95, 1997 DEM.

**Lecidella carpathica* Korber On periodically submerged sandstone by North Tyne at Warden Rocks near Hexham, 35/96, 1996 OLG.

**Leproloma vouauxii* (Hue) Laundon Concrete step of a school in Walker, Newcastle, 45/26, 1997 DEM. Probably widespread in the county.

*Lobaria pulmonaria* (L.) Hoffm. Monk Wood: Since its discovery on *c.* 20 oaks here in 1969, the species declined to a presence on only 5 trees in 1978, and then two trees, one fallen, in 1981. This was still the position in 1992 when transplant work was undertaken in an attempt at species recovery. Three years later half the transplants were still alive and continue to be monitored. The species is still well established on a single ash in the parkland. The decline on oak has been attributed to acid rain (Gilbert 1986). At Burnmoor on Wark Burn, there has been a considerable decline due to the effects of Dutch Elm Disease and a survey in 1992 showed the species present on 5 standing ash and 2 fallen ash. At Gofton Burn the species is still well established on two ash, 1995.

*Micarea bauschiana* (Korber) V. Wirth & Vezda Sheltered sandstone cliff, West Crag, Derwent Gorge, 45/04, 1996 DEM.

**M. botryoides* (Nyl.) Coppins North facing sandstone crags, Sweethope Lough, 35/89, 1983 B. J. Coppins. Sheltered sandstone crag, Gill Pike, Kielder Western Moors, 35/68, 1995 OLG. Shaded sandstone Derwent Gorge 45/04, and Harwood Shield, 35/95, 1995 DEM. An overlooked species that is probably widespread.

*M. denigrata* (Fr.) Hedl. Widespread on lignum and heather stems; occasional on

sandstone. OLG & DEM.

*M. erratica* (Korber) Hertel, Rambold & Pietschm. Pebble in rough pasture, Harwood Shield, 35/95, 1997 DEM.

**M. lithinella* (Nyl.) Hedl. Acid sandstone, Harwood Shield, 35/95, 1997 DEM.

**M. myriocarpa* V. Wirth & Vezda ex Coppins Sheltered vertical sandstone, East Crag, Derwent Gorge, 45/04, 1997 DEM.

*Nephroma laevigatum* Ach. Mossy rocks by the river West Allen as it flows past Monk Wood, Whitfield Park, 35/75, 1995 E. Smith. A further ancient woodland indicator for this site.

*Pachyphiale cornea* (Ach.) Arnold On ash by the Wark Burn, 35/82.77, 1980 F. Rose.

*Parmeliopsis hyperopta* (Ach.) Arnold Rare on beech, Monk Wood, Whitfield, 35/75, 1981 R. Tapper.

**Peltigera neckeri* Hepp ex Mull. Arg. Abundant on sand dunes at Bamburgh, 46/13, 1997 A. M. & B. J. Coppins.

**P. venosa* (L.) Hoffm. Heavy metal shingle by the River North Tyne at Williamston 35/65, 1997 E. C. Smith.

*Pertusaria aspergilla* (Ach.) Laundon Locally frequent on acid walls near Blanchland 35/95 and Riddlehamhope, 35/94, 1991 DEM.

**Phaeophyscia sciastra* (Ach.) Moberg On top of andesite boulders in the River Coquet, Linbriggs, Cheviots, 36/80,1996 OLG.

*Placopsis gelida* (L.) Lindsay On basalt sill at 350 m, Faugh Cleuch, Thinhope Burn, 35/640536, 1990 R. W. M. Corner.

**P. lambii* Hertel & V. Wirth On mine spoil, Harwood Shield, 35/95, 1997 DEM.

*Porina chlorotica* (Ach.) Mull. Arg. On damp rocks in the Derwent Gorge, 45/04, 1996 DEM.

*Psora lurida (Ach.) DC* Limestone, Woldgill Scar, Gilderdale, 35/679462, 1977 R. W. M. Corner.

**Pterigiopsis lacustris* P. M. Jorg. & R. Sant. By the River North Tyne at Warden Rocks near Hexham, 35/96, 1996 OLG.

**Pyrenocollema strontianense* (Swinscow) R. Harris On andesite submerged in the River Coquet, Linbriggs, Cheviots, 36/80, 1996 OLG.

**Rhizocarpon subgeminatum* Eitner Sandstone Crag, Gill Pike, Kielder Western Moors, 35/68, 1995 OLG.

**Rinodina conradii* Korber On turf edge, near the castle, Holy Island, 4614, 1991 A. Fryday.

*Schaereria cinereorufa* (Schaerer) Th. Fr. On horizontal ledges on walls in the uplands, Harwood Shield 35/95 and Beldon Burn, 35/94, 1996 DEM.

*Tephromela grumosa* (Pers.) Hafellner & Roux Frequent on acid rocks and walls in the south-west uplands, 1995 DEM.

**Trapelia corticola* Coppins & P. James On the mossy bark of a single ash in sheltered woodland by Snope Burn, 35/65, 1979 OLG.

*T. obtegens* (Th. Fr.) Hertel The species with small ochraceous soralia referred to in Gilbert (1980) as *Trapelia* sp. is now known to be this species.

**T. placodioides* Coppins & P. James All material listed in Gilbert (1980) as *T. obtegens* is referable to this species.

*Trapeliopsis flexuosa* (Fr.) Coppins & P. James Widespread on hard lignum, old gorse stems and damp sandstone. OLG & DEM.

**T. glaucolepidea* (Nyl.) G. Schneider Wet peat on vertical side of ditch in spruce plantation, Paddaburn Moor, 35/65.78, 1981 I. Day.

**T. pseudogranulosa* Coppins & P. James Frequent on mossy shaded tree boles and on peaty banks by tracks crossing moorland. OLG & DEM.

*Umbilicaria torrefacta* (Lightf.) Schrader Sandstone outcrop, Gill Pike, Kielder Western Moors, 35/61.83, 1995 OLG.

**Verrucaria funckii* (Sprengel) Zahlbr. On submerged andesite in the River Coquet at Linbriggs, Cheviots, 36/80, 1996 OLG.

**Verrucaria simplex* McCarthy On fragment of mortar on woodland floor, Morpeth, 45/28, 1980 B. J. Coppins (E-holotypus), (McCarthy 1988).

Contributors are thanked for sending their records to OLG who continues to welcome lichen data from the two vice-counties.

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## BOOK REVIEW

**Dandelions of Great Britain and Ireland** by **A. A. Dudman** and **A. J. Richards**, with illustrations by **Olga Stewart**. Pp. 344 with silhouettes of herbarium specimens of most of the 235 spp. and 179 distribution maps. Botanical Society of the British Isles. 1997. £17.50 paperback.

This volume is the most recent of the B.S.B.I. handbooks, each of which deals with a single family or genus of plants. The short introduction covers the history of taraxacology; apomixis is explained, perhaps too briefly; golden rules and caveats for the observation of specimens are listed; there is a section on the ecology, distribution and status of British and Irish dandelions. It is recommended that the study of dandelions is best carried out by accumulating a reference herbarium and there is good guidance on how to collect and on what to observe. Because of the variability of species, it is necessary to consider a combination of characters. However, an attempt has been made to give both multi-access and dichotomous keys to sections and species in order to narrow the search amongst the species accounts. Their usefulness will only be able to be tested next season. We are warned that "dandelions are difficult"! The systematic section consists of a full description of each species, with the most important characters in italics, its status, habitat preference(s), distribution and further helpful comments. There is a silhouette, reduced in size, of a herbarium specimen of nearly all species and an excellent life-sized drawing of a capitulum of most by Olga Stewart. What a pity she didn't also illustrate the whole plant! There are distribution maps of 179 of the 235 species, a glossary, a list of synonyms and a useful drawing of the parts of a dandelion plant. Five minor corrections, mainly to authorities for species names, are listed in B.S.B.I. News 76, p. 81. For anyone proposing to engage in a study of dandelions or just wishing to identify those which harbour slugs or feed bees in the garden, this is the essential *vade mecum*.

PPA

# ALARM CALLS AND PREDATOR DISCRIMINATION IN POPULATIONS OF THE HOUSE SPARROW *PASSER DOMESTICUS* IN LEEDS

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ABSTRACT

Field data from a study conducted on an urban population of House Sparrows *Passer domesticus* in Leeds indicated that they produce specific alarm calls to warn foraging conspecifics of an imminent attack by a predator. A loud 'quer-quer-quer' alarm call was only produced in response to the presence of either a Common Kestrel *Falco tinnunculus* or a Eurasian Sparrowhawk *Accipiter nisus*, whereas ground predators (domestic cats, *Felis silvestris catus* and humans, *Homo sapiens*) resulted in the production of a quiet, 'chree' alarm call uttered on take-off. The role of the alarm calls produced by the Leeds House Sparrow population differs from that previously reported for the same calls.

The House Sparrows demonstrated three different anti-predator strategies in response to an alarm call. The freeze/crouch response was only performed by juveniles, whereas adults either exhibited a short flight into dense hedge or a longer flight high into a tree. In response to an attack by Common Kestrels, cats and humans, the adults used either a long or short flight response with equal frequency. On attack by Eurasian Sparrowhawks the House Sparrows demonstrated a significant preference for the short flight response into dense cover.

The data presented shows that House Sparrows produce different alarm calls depending upon predator class and take an appropriate anti-predatory response to minimise predation risk.

## INTRODUCTION

Summers-Smith (1963) noted that House Sparrows produce a wide variety of calls. The basic House Sparrow alarm call has been described as a nasal 'quer' which is either uttered as a single note or repeated two or three times, occasionally with additional variations (Summers-Smith 1963, 1988). The call appeared to be used most frequently in ambivalent situations, and also occasionally in response to the approach of an enemy from which the individual bird could escape from by flight.

Barnard (1979) studied the interactions between House Sparrows and Eurasian Sparrowhawks. House Sparrows produced an alarm call when the Eurasian Sparrowhawk appeared, and the flock retreated into the bottom of a tall hedge and kept up an 'incessant chatter' until the hawk departed. The alarm call was described as being the typical alarm call, but there was no comparison with other predators to determine if the call was specific. House Sparrows also produce a 'kruu' call in response to an aerial predator which results in the flock retreating to cover and remaining silent (Birds of the Western Palearctic, 1994). In Leeds, House Sparrows were observed to use an alarm call corresponding to the nasal 'quer-quer' call which is usually made against a ground predator (Summers-Smith, 1988; Birds of the Western Palearctic, 1994).

During this study, the response of House Sparrows to attack by two aerial predators and two perceived ground predators was monitored in an urban environment. Two aerial predators, Common Kestrels and Eurasian Sparrowhawks, commonly tried to capture House Sparrows. Small passerines may make up to 76% of a Common Kestrel's diet by weight in urban environments (Shrubb, 1993). The two perceived ground predators were domestic cats and humans. The aim of the study was to determine if House Sparrows used specific calls for both aerial and ground predators to warn foraging conspecifics of imminent predator attack and to record the response of the House Sparrows to the alarm call.

## Methods and Materials

### *Site*

The anti-predator behaviour of House Sparrows was observed at regular intervals from February 1993 until March 1994, whilst they foraged at an artificial feeding station in a small garden in south Leeds, England. A large colony of House Sparrows is established in this area, nesting in the rooftops of the houses; the site thus provides an ideal opportunity to observe House Sparrow behaviour in the field. A feeder was placed in the centre of the garden, equidistant from a 1.5 m high fence and a 3 m high privet hedge, and was replenished daily with 50 ml of a mixed seed and grain mixture. At the bottom of the garden, 15 m away from the feeder, there is a large sycamore tree. The observer sat in the house 10 m away from the feeder with a clear all-round view of the area. Flocks of between three and sixty-three House Sparrows were observed foraging at the feeding station.

Although the increased density of foraging birds around a feeding station may attract predators, House Sparrows are social birds in both urban and rural environments (Summers-Smith, 1988). Therefore the behaviour of the predators around the garden feeding station would reflect patterns observed in more natural situations, as House Sparrows commonly forage in flocks and will attract conspecifics to food (Elgar, 1986).

### *Description of calls*

In this study, the House Sparrows were observed to produce two main alarm calls: a shrill, loud, trisyllabic 'quer-quer-quer' call emitted prior to alarm flight, and a quieter monosyllabic high-pitched 'chree' uttered on take-off. Both calls resulted in either alarm flights or a freeze/crouch response of the birds foraging at the feeding station, and on hearing a call the area was scanned for both ground and aerial predators.

### *Attack type of predators*

All ground predators were viewed as producing random surprise attacks, as on all occasions they suddenly appeared in view of the foraging House Sparrows and were not under the observer's control. Domestic cats are a major predator of House Sparrows in the area, making surprise attacks from dense undergrowth.

Aerial predators showed two different forms of attack flight. A surprise attack consisted of a fast, low flight hugging the contours of the trees or rooftops, with the predator suddenly appearing within sight of the foraging House Sparrows (as the Contour-hugging flight described by Wilson and Weir, 1989). A non-surprise attack was construed as being a clear view of the predator as it approached the foraging House Sparrows. During the study, there were no successful captures of House Sparrows by either of the aerial predators.

### *Response of House Sparrows to predator attack*

The response of House Sparrows to attack by the two aerial predators, Common Kestrels and Eurasian Sparrowhawks, was compared to that of their response to two perceived ground predators (cats and humans). The type of alarm call produced, the predator making the attack, (the type of attack in the case of an aerial predator), and the sex of the House Sparrow making the call was noted. The results were only noted for the first instance of alarm calling for each attack by a predator. As the observation site gave a clear view of the surrounding area, it was possible to locate and classify the individual caller. Birds were assigned as males, females and juveniles according to plumage patterns (Summers-Smith, 1988).

The response of foraging House Sparrows to a perceived predator attack was also observed, and three different responses were noted:

Response A: a long flight (15 m) into the shelter of the sycamore tree,
Response B: a short flight (3 m) into the shelter of the tall privet hedge,
Response C: freeze/crouch response where the bird remained at the feeding station but crouched low and remained still and quiet.

The first bird that responded to the alarm call or attack may determine the subsequent responses of the other members of the flock. For each predator, ten separate attacks were observed and the response of the first bird to the attack was recorded.

G-tests were performed on the data with William's correction as described in Sokal and Rohlf (1995).

## Results

### *Call specificity*

In total, 165 separate attacks by aerial predators (Common Kestrel n = 103, Eurasian Sparrowhawk n = 62), and 242 separate attacks by perceived ground predators (cat n = 112, human n = 130) were observed (Table 1). The 'quer-quer-quer' call was only produced in response to an aerial predator (Gadj = 202.2, df = 1, P<0.0001), whereas the 'chree' call was uttered by House Sparrows taking flight during attack by ground predators. On 162 times out of the 165 occasions on which the 'quer-quer-quer' call was heard, it was produced by a vigilant House Sparrow in response to the appearance of either hunting Common Kestrel or Eurasian Sparrowhawk. The calling House Sparrow then took flight into shelter after uttering the call. The 'quer-quer-quer' call was never produced when cats or humans disturbed the foraging birds. On three occasions the 'quer-quer-quer' call was heard when neither Common Kestrel nor Eurasian Sparrowhawk were observed. In these instances, juveniles apparently emitted the call in response to Collared Doves *Streptopelia decaocto* flying over the rooftops. House Sparrows did not produce the 'quer-quer-quer' alarm call in response to any other birds, including Feral Pigeon *Columba livia*, Wood Pigeon *Columba palumbus*, Carrion Crow *Corvus corone*, Eurasian Jackdaw *Corvus monedula*, Herring Gull *Larus argentatus*, Common Gull *Larus canus*, Magpie *Pica pica*, Starling *Sturnus vulgaris*, Blackbird *Turdus merula* and Mistle Thrush *Turdus viscivorus*. In response to the presence of other birds close to the nest, both sexes produced loud 'churr-it-it- it' calls. Even when fledgling and juvenile House Sparrows were pursued and killed by Magpies, the House Sparrows did not produce the 'quer-quer-quer' call. A monosyllabic version of the call was also heard but with no obvious cause.

TABLE 1

Frequency of House Sparrow alarm calls in response to attack by different predators.

*Denotes 'chree' call heard after initial 'quer-quer-quer' call.

| Predator | 'quer-quer-quer' call heard | 'chree' call heard | Total number of attacks by predator |
|---|---|---|---|
| Eurasian Sparrowhawk | 62 | 1* | 62 |
| Common Kestrel | 103 | 3* | 103 |
| Cat | 0 | 112 | 112 |
| Human | 0 | 131 | 131 |

Contrary to this, the 'chree' call was primarily produced when the House Sparrows were under attack by ground predators (Gadj = 295.5, df = 1, P<0.0001). On 239 times out of the 243 occasions on which the call was heard, it was in response to an attack by a ground predator and was emitted as the House Sparrows took flight. Only four 'chree' calls were produced as House Sparrows took flight in response to the 'quer-quer-quer' alarm call.

Both sexes were observed to produce the alarm calls, although there was a marked seasonal difference in the frequency of calling by either sex. In spring, summer and autumn, males were observed to produce the 'quer-quer-quer' calls at higher frequency than females (Fig. 1; for spring, summer and autumn Gadj>8.7, df = 1, P<0.01). In winter, both sexes called with equal frequency (Gadj = 0.89, df = 1, P>0. 1).

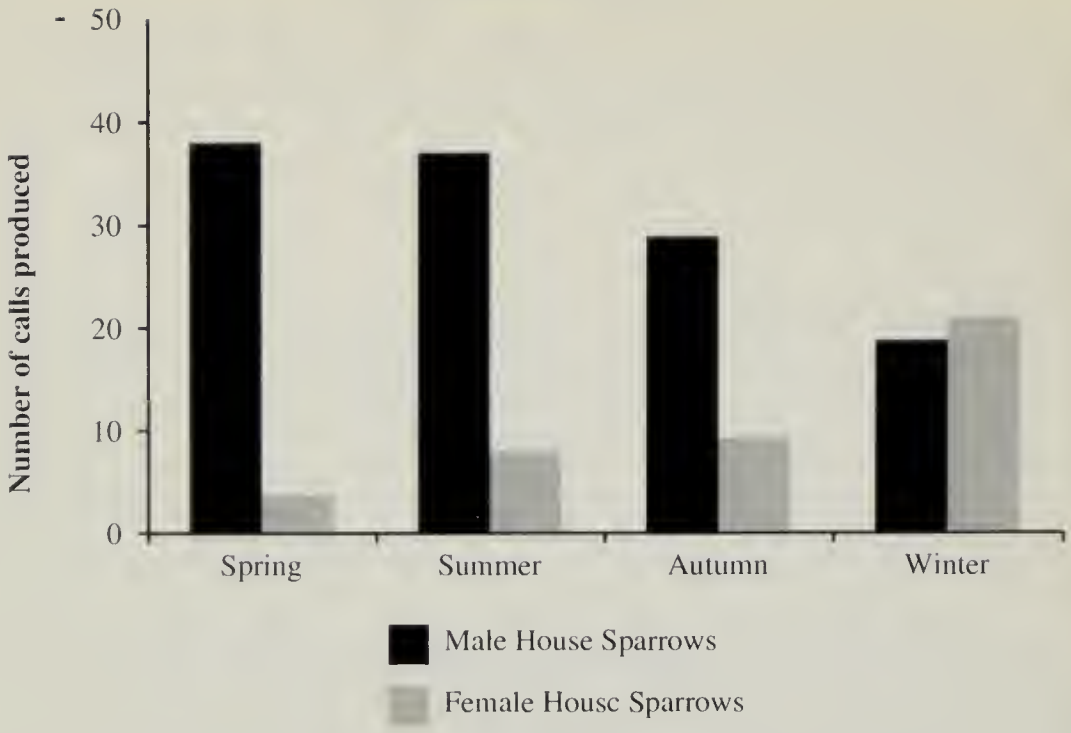


FIGURE 1
Frequency of alarm calls produced by male and female House Sparrows in each season.

*Aerial predator attack type*
Both Common Kestrels and Eurasian Sparrowhawks used surprise and non-surprise attacks whilst foraging, but there was a difference in the frequency of the attack type between the two aerial predators. Eurasian Sparrowhawks primarily used surprise attacks (Gadj = 27.7, df = 1, $P<0.001$); out of 62 observed Eurasian Sparrowhawk attacks, 51 of these were surprise attacks. The Eurasian Sparrowhawks were also observed during attack to pursue the House Sparrows into the tree in an effort to catch them.

Common Kestrels primarily hunted using non-surprise attacks (Gadj = 35.7, df = 1, $P<0.0001$). Out of 103 attacks, 81 were of the non-surprise type.

*Response to attack.*
There was a difference in the frequency of the response of the House Sparrows to attack by the four different predators. Only the juvenile House Sparrows (irrespective of the response of the adults) performed the freeze/crouch response (response C). When attacked by Common Kestrels, cats or humans, the adult House Sparrows either flew to the hedge (response B, short flight) or to the tree (response A, long flight) with equal frequency (Gadj $P>0.1$ in all cases). When attacked by a Eurasian Sparrowhawk the adult birds showed a preference for the short flight response (Gadj = 4.9, df = 1, $P<0.05$) and took shelter within the tall hedge.

## Discussion

House Sparrows produce a specific alarm call in response to the appearance of either a Common Kestrel or a Eurasian Sparrowhawk. This specific alarm call consisted of a trisyllabic, loud 'quer-quer-quer' (although birds were often heard to utter single note 'quer' calls in ambivalent situations). On hearing the call, foraging adult House Sparrows immediately responded with an alarm flight into cover. The 'quer-quer-quer' response was not elicited by the approach of humans or domestic cats near to the foraging station (Table 1), or by the presence of other avian species in the vicinity of the nest. Attack by ground

predators, namely cats and humans, resulted in the production of a quiet 'chree' call which was uttered on take-off and again resulted in an alarm flight. These findings are somewhat contrary to the role described for these calls in Birds of the Western Palearctic (1994), but correspond to that of Summers-Smith (1988). Buitron (1983) demonstrated that [Black-billed (American name)] Magpies *Pica pica* produced specific staccato alarm calls on sighting aerial predators (hawks and falcons), but did not produce the same call on the approach of ground predators or when a person handled young from the nest. Three lapwing species *Vanellus* spp. also produced specific alarm calls when large reptiles approached foraging birds and their young (Walters, 1990).

During spring, summer and autumn, male House Sparrows produced the 'quer-quer-quer' call at a higher frequency than females, but in winter both sexes called with equal frequency (Fig. 1). During the breeding season, male House Sparrows are visible on the rooftops guarding the nest and brooding females (Summers-Smith, 1963) and the higher frequency of calling by the males during spring and summer months is probably the result of the breeding behaviour of the birds. In winter, House Sparrows form large flocks and devote much of their time to social activities (Summers-Smith, 1963, 1988). Both sexes actively forage or partake in social activities and called with equal frequency.

Juveniles did not produce the 'quer' call except on three occasions in response to Collared Doves, which do have a hawk-like silhouette. Observations of the responses of both wild and hand-reared [Black-billed] Magpie young to predators suggested that they have an innate fear response, and subsequently learn what constitutes an alarm with experience (Buitron, 1983). Therefore, juvenile House Sparrows may have to learn when to produce the 'quer' alarm call, and the calling of the juveniles in response to Collared Doves may be an innate response of an inexperienced bird.

Adult House Sparrows demonstrated no preference for long or short alarm flights when under attack by cat, man or Common Kestrel, but when attacked by a Eurasian Sparrowhawk they demonstrated a preference for a short flight into the tall hedge. Eurasian Sparrowhawks primarily use surprise attacks, frequently diving into vegetation in pursuit of their prey (Rudebeck, 1950). In this study, the Eurasian Sparrowhawks often flew into the sycamore tree after the House Sparrows, whereas they did not enter the dense hedge. The hedge was also closer to the foraging station than the tree. Cowie and Simons (1991) showed that House Sparrows tend to use feeders which are the closest to cover, and that food consumption at a feeder only 2 m away from cover was double that at feeders 10 m away. By preferentially retreating into the hedge when attacked by Eurasian Sparrowhawks, the House Sparrows minimise the risk of predation.

Juvenile House Sparrows were frequently observed to use a freeze/crouch response in response to the alarm calls, remaining still and quiet until other birds emerged from cover. Summers-Smith (1963) noted that the production of the 'quer' alarm call by their parents immediately silenced the young in the nest. Once all the House Sparrows had reached cover they remained silent until the predator had disappeared from the view of vigilant birds.

House Sparrows can discriminate between raptors and other avian species whilst they are in flight, and produce a specific alarm call to warn foraging conspecifics of imminent attack by aerial predators. A different alarm call is produced in response to ground predators and House Sparrows appear to minimise predation risk by taking appropriate anti-predator responses to attack.

ACKNOWLEDGEMENT

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# THE PLANTS OF HULL: AN ELECTRONIC ATLAS

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## Introduction and Objectives

The urban environment is arguably one of the most diverse and ehangeable of habitats available to plants. In rural arcas land use tends to be relatively uniform over large areas and ehange is slow, presenting much more stable environments in which plant communities often attain at least some degree of stability. Towns, on the other hand, arc suseeptible to rapid changes which may be brought about by a variety of economic factors and influeneed by prevailing fashion eonsiderations. The plants of rural Britain are becoming inereasingly well doeumented with published floras which will probably serve as reasonably accurate deseriptions for several deeades at least. Towns are not so well served and the speed of eolonisation with new speeies and the inevitable losses of others due to development make printed deseriptions quickly out of date.

The objectives of this study were two-fold. The first aim was to make a new inventory of the plants eurrently growing in Hull and to present somc critieal analysis of the information. The seeond important objeetive was to devise a method for presenting and distributing such data in a form which could bc continually updatcd. Of these objectives the first is by far the easiest, requiring nothing more than the teehniques employed for a standard printed flora. The second objeetive was to be attaincd by use of clectronic publishing, using the 'World Wide Web' (WWW) or 'Internet' as a vehicle and for which, so far as I am aware, there is as yet littlc prccedent. A notablc exeeption is the flora of Hämeenlinna, Finland eompiled by Raino Lampinen (http:/www.helsinki.fi/kmus/hml/), here distribution maps for 799 species of vaseular plant are presented.

In our inereasingly litigious times there is a growing awareness of intellectual property rights. Wc have been conscious of the rights of an author, well protected by copyright laws, and always strive to avoid accusations of plagiarism by acknowledging information sources, but in the world of biologieal recording this is more difficult. Although individuals undoubtedly retain intelleetual property rights over eaeh observation they make; were each

record to be individually acknowledged the production of distribution atlases would become almost impossible. Since such published atlases generally only provide a list of contributors, there is no way of attributing individual records back to their 'owners'. This then presents an area of difficulty for subsequent authors who wish to analyse the published information further: how can they do this without infringing the rights of the original observers, not to say those of the atlas editor? When information is published electronically the problem is amplified considerably. It becomes extremely easy to copy data, opening up the possibility of analyses which would have been prohibitively time-consuming if derived

## GENTIANACEAE

- Centaurium
- Blackstonia

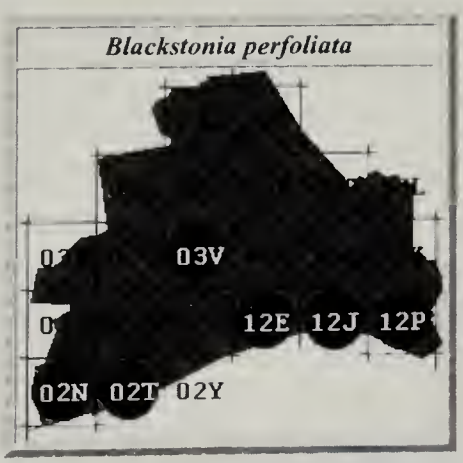
### Centaurium


**Common Centaury**

So far found only on waste-land adjacent to the River Humber, often in great profusion.

[genus index] [family index] [Scientific index] [English index] [main index]

### Blackstonia




**Yellow-wort**

Found in similar situations to Centaury and often with it. There are, however, several sites where they are not associated although Centaury may have been expected. The most notable of these was the site of the old gas works on Clough Road, 03V, where Yellow-wort is locally abundant.

[genus index] [family index] [Scientific index] [English index] [main index]

FIGURE 1
Sample page: the family Gentianaceae

from printed sources. With this in mind, I have decided that all records used in the project must be contributed on the basis that they are freely available for all academic and conservation purposes.

## Methods

The system of recording in tetrads was adopted for this project in order to retain compatibility with national recording schemes. The city of Kingston upon Hull lies almost entirely within 22 tetrads if the very few tetrads containing <0.5 km$^2$ of land within the boundary are ignored. Of these tetrads only two, TA 13 L and TA 03 K, contain less than 1 km$^2$ within the city boundary. To avoid unnecessary complication it was decided that tetrads should be examined in their entirety, regardless of the section within the boundary. This does make a significant impact upon the results since TA 03 K, on the western edge of Hull, contains some exceptionally rich neutral pasture land. This tetrad contributes a large number of species found nowhere else but since most of the land, although outside the boundary, is owned and managed by the city, the inclusion can also be justified on political grounds. It was found convenient to transfer the tetrad boundary information to a large scale street map. Routes were planned within the tetrads and a minimum of 3 hours spent in each. Some tetrads have been worked more extensively, with several visits as the opportunity arose, and post-1996 data from other recorders (principally R. Eades) have been incorporated.

The taxonomy of Stace's *Flora* (1991) has been adopted and all collected data are stored as 22 master lists, one per tetrad. Since it is intended to keep the results as up to date as possible, it was essential that mechanisms were devised to ensure that new records could be added quickly and easily. All data storage is on a PC computer and the necessary programs have been written in Delphi (Borland International Inc). It is beyond the scope of this article to describe the software in any detail but I will be happy to provide information to anyone interested.

To make the data available to everyone it needs to be converted into hyper-text mark-up language (HTML) format files and then mounted on an internet server. Again, special software had to be written so that the HTML scripts could be generated directly from the database quickly and without error. Preliminary versions were text only but it was found advisable to include maps as well. At first the text and maps were kept separate but this proved unsatisfactory and the current version manages to present both on the screen together (Fig. 1). A full alphabetic index with both scientific and vernacular names is available.

## Discussion

Although much of the first year was expended on implementing the systems rather than generating data, a broad picture of the flora of Hull did emerge. Further work in 1997 filled some of the gaps and added several new species. The success or otherwise of the project must be decided by the use which is made of the database. The great benefit of electronic publishing is that users can quickly become contributors by sending suggestions and new records to the author by electronic mail (e-mail). Any new information thus provided can be incorporated into the electronic atlas, providing future users with the very latest information.

I realise that relatively few naturalists have access to the internet at the moment but this is almost certain to change within the next few years. I would be grateful for feedback on this project with comments on the suitability of the medium for the dissemination of distribution data, suggestions for improvements and even further records. The atlas is available at http://www.hull.ac.uk/php/ggsrm/hullnats.htm, and is best viewed with Netscape 2.0 or greater, or any other web browser which supports simple graphics.

# A HISTORICAL REVIEW OF THE OTTER (*LUTRA LUTRA* L.) IN NOTTINGHAMSHIRE

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## Introduction

This review forms the first of a series of studies designed to provide background data to current monitoring of the otter (*Lutra lutra*) in river catchment systems in Nottinghamshire and the contiguous region to the north which English Nature and the Countryside Commission have recently designated as the 'Humberhead Levels Natural Area' (Hirst, 1997).

Nottinghamshire's two main river systems, the Trent and Idle, together with the Chesterfield Canal, pass into or through the 'Humberhead Levels', and the Nottinghamshire Carrs with their networks of ecologically interesting drainage dykes, form the southern portion of this geographically distinctive lowland wetland region.

The reviews are also being compiled to utilise the wealth of historical allusions in support of otter habitat creation initiatives in a range of Environment Agency 'River Catchment' and 'Water Level Management Plans' and Flood Defence Maintenance Programmes'. Through local 'Biodiversity Action Plans' they will also assist statutory water management bodies and riparian land owners (Internal Drainage Boards, British Waterways, Local Authorities, etc.) to target riparian habitat management programmes for the eventual re-establishment of viable otter populations within the lower Trent/Ouse region.

## Data Sources

Records of otters in the county of Nottinghamshire have been derived from a wide range of archival, published, material and verbal anecdotal sources. These include parish records, hunt trophies, museum specimens, press reports, natural history journals, topographical and local historical works and interviews and correspondence with local hunt-followers, naturalists, taxidermists, anglers, farmers and other residents. Table I shows the productivity of the various data source categories up to the 19th century and for each half century from 1800.

TABLE 1

Variations in the productivity of data sources*#

| | Archives | Press | Scientific Literature | Regional Histories & Topographies | Specimens | Personal Comms. | Total | % |
|---|---|---|---|---|---|---|---|---|
| Pre-19th century | 24 | 6 | 0 | 40 | 0 | 0 | 70 | 42.40% |
| 1800-1849 | 2 | 0 | 1 | 13 | 0 | 0 | 16 | 9.70% |
| 1850-1899 | 0 | 9 | 13 | 8 | 1 | 0 | 31 | 18.80% |
| 1900-1949 | 0 | 5 | 1 | 1 | 2 | 5 | 14 | 8.50% |
| 1950-1997 | 0 | 8 | 5 | 0 | 1 | 20 | 34 | 20.60% |
| TOTAL | 26 | 28 | 20 | 62 | 4 | 25 | 165 | 100% |
| % | 15.80% | 17.00% | 12.10% | 37.60% | 2.40% | 15.10% | 100% | |

*1 otter or allusion = 1 point. Duplicate sources for the same record also added.
#Date periods refer to records not sources.

*16th to 19th Century Bounty Payments*

Evidence of bounty payments made for otters can occasionally be located in the accounts of churchwardens and other parish officials in riparian parishes from the late 16th century to the first quarter of the 19th century (Howes, 1978, 1984). Such evidence provides dates or years of occurrence and confirms presence within a delineated parish and therefore within a fairly precise location or a specific water course.

Searches were made at the Archives Departments and the Records Offices at Doncaster, Nottingham and Lincoln to trace documents relating to riparian parishes in the county of Nottinghamshire.

Of 31 targeted parishes (see Appendix 1), relevant archives from the appropriate date period only survived for 15 (48%) of them. Of these, 13 parishes contained records of 'vermin' bounty payments and of these, 8 (26% of target parishes) produced records of otters.

Appendix 2 lists 69 otter records abstracted from churchwardens' accounts from eight Nottinghamshire riparian parishes. Each record is inserted in chronological order in the relevant river system reviews.

*19th and early 20th century records*

Depending on the observer, first-hand field observations are either notified to a local newspaper or to a local scientific society. Newspapers of the Doncaster and Nottingham regions, examined on microfilm at Doncaster Central Library, and the W. Doubleday local history card indexes and press cuttings 'scrap books', examined at Nottingham Central Library, provided an invaluable source of records, status comments and photographs. Natural history journals, notably *The Naturalist* and to a lesser extent publications of the Nottingham, Sorby (Sheffield) and the Doncaster Natural History Societies also proved to be a useful source.

Periodic reviews of these, together with other casually gathered records and anecdotes, often from game keeping or hunting sources, have been located in local history and topographical sources, particularly Miller (1804), Hatfield (1866), White (1904), Carr (1906) and Halton (1966). The general consensus was that otters occurred commonly in most of the Nottinghamshire river systems.

*Otter Hunting up to the 1970s*

The Buckinghamshire Otter Hounds, formed in 1890 (Ivester-Lloyd, undated), visited many of the unpolluted waters of Nottinghamshire by invitation of the riparian owners. These visits included the rivers, drains and lakes of the Hatfield Chase and the North Nottinghamshire Carrs, the Dukeries and the rural tributaries of the Trent, basing themselves at such places as Bawtry, Blyth or Southwell for their annual late summer week's sport. To date I have failed to locate examples of hunt diaries, or other archives of this historic pack's activities in Nottinghamshire, the monitoring of population trends based on hunting statistics has therefore not been possible within the study area. Press reports, anecdotes from huntfollowers and the examination of hunting trophies have however, provided useful distributional and date records. Strachan and Jefferies (1996), examining the results the Buckinghamshire Otter Hounds across the entire 18,900 km of its hunting range (Buckinghamshire to Lincolnshire and the Humber), show that from 1950 to 1955 the mean success rate was equivalent to 70 'finds' per 100 days of hunting. In 1966 the rate had dropped to 28 'finds' per 100 days and by 1971 it had dropped to the equivalent of 16 'finds'.

*Post 1950s records*

Correspondence with River Board managers and Otter Hunt Masters from 1952 to 1954 (Stevens 1957) indicated that most rivers associated with the Trent were sport-hunted and all were said to be well stocked with otters. This reflected the perceived position immediately prior to the widespread organochlorine-related population 'crash' starting in

1957 identified by Chanin and Jefferies (1978). Significantly, by 1966 the otter was being described as 'uncommon in Nottinghamshire' (Halton 1966). Fortunately, otters appear not to have been totally eradicated in the then reasonably pastoral and wooded catchment of the Idle and Ryton in the northern extremities of the Dukeries. According to anecdotal accounts from a range of anglers, naturalists and country residents, otters were still in evidence, if seldom recorded, during the 1960s, 1970s and evidently up to the mid-1990s (see river system reviews and Appendix 3).

*National surveys*

River catchments in the Nottinghamshire region have been included in four national surveys of otter status and distribution. The first (Stevens 1957), as mentioned above was undertaken during 1952 to 1954, largely through correspondence with River Board managers and Otter Hunt masters and effectively related to all water courses. Her report gave no cause for concern.

In 1977-79 (Lenton *et al.,* 1980), 1984-86 (Strachan *et al.,* 1990) and again in 1991-94 (Strachan and Jefferies 1996) the Nature Conservancy Council monitored trends in otter distribution in England. This was achieved by the examination of sample sites along designated stretches of riparian habitats within the north-western and south-eastern quarters (50 km squares) of alternate 100km squares of the national grid. Sadly the Idle catchment with its tributaries, the Poulter, Meden, Maun and Rainworth Water, all in SK north-east, was not included. However, the waters in SK south-east, including the Trent upstream of Newark, the Fairham Brook, the Smite, Devon and part of the Soar, all in Nottinghamshire, were surveyed, though rather more than half of this sample square is actually in Leicestershire.

For the first NCC survey of the 50 km square SK south-east, 125 sample sites were visited by E. J. Lenton in November and December 1978. She reported that in the main river disturbance was high owing to angling, boating and the proximity of large urban areas. Of the several large gravel pit complexes in the Trent valley some were still active, some were devoted to water sports but some of the older disused examples had good bankside vegetation. Some of the tributaries also offered potential otter habitat. Although there was some recent anecdotal evidence, no positive signs were located but mink (*Mustela vison* Schreber) evidence was found at two sites.

For the second NCC survey, 138 sample sites together with five spot check sites were examined in January 1986. As in 1978 no evidence was found on the main river and tributaries which offered sparse cover. A few reservoirs and gravel pits provided some suitable habitat but no confirmed evidence had been reported in recent years and five 10 km squares within the sample block produced signs of mink (Strachan *et al.,* 1990).

For the third survey, the sample and spot check sites were examined in difficult conditions of high water and extensive flooding in December 1992. This time two adjacent sites near Melton Mowbray on the river Wreake (a Leicestershire tributary of the Nottinghanshire Soar and close to the Smite catchment) showed signs (spraints) of otters. The spraints were fairly old and judged to be evidence of a transient animal rather than a resident population. Evidence of mink was located in twenty 10 km squares within the sample block (Strachan & Jefferies, 1996).

## Historical Review per River System

Records from all sources are presented in chronological order within river systems. The waters of the Idle catchment precede with the tributary waters arranged from north to south. Other rivers follow in alphabetical order.

*River Idle (Downstream of Bawtry)*

Churchwardens' accounts for the parish of Misterton show that bounty money was paid for one otter in 1696 and four in 1708.

Referring to the closing years of the 18th century, Miller (1804) affirmed the presence of

'many of these animals between Bawtry and Stockwith'.

An otter was present in the Misson (SK/6994) area for a long period during 1832 (Hatfield 1866), a specimen killed in the Idle near Bawtry (SK17195) on 31st December 1838, and in letters dated 1859 and 1863, William Brook of Bawtry noted that '. . . otters were found in the Idle . . . down stream to Misson' (Hatfield, 1866).

Anglers occasionally encountered otters along the Idle down stream of Bawtry during the 1950s and 1960s (Hanson, 1975), e.g. one at Idle Stop (SK/6591) in 1955 (Jackson, 1976) and local farmers still knew of their presence in the Idle in the Gringley Carr area (SK/7195) up to about 1962 (Teesdale, 1982). Recent records to hand from the extensive, artificially drained arable 'open-plan' landscape downstream of Bawtry are from the taxidermist Neil Wood (Wood 1993) who claimed its continued presence in the Misterton Soss/West Stockwith area (SK/7795; 7894) through the late 1980s and perhaps beyond.

*River Idle (Upstream of Bawtry)*

Churchwardens' accounts from the parish of Clayworth (SK/7188) show that bounty money was paid for an otter in 1677 and for another in the parish of Gamston (SK/7076) in 1706.

In 1832, John Chapil, a River Idle punt-gunner, stalking a flock of wild ducks, shot an otter on the bank at the junction of the Rivers Idle and Ryton, between Bawtry and Scrooby (SK/6591). The specimen, 3' 6" in length, was preserved by John Youdan of Bawtry (Hatfield, 1866). The Doncaster taxidermist Hugh Reid reported one killed in the Idle near Bawtry (SK/6593) on 31st December 1838 and an adult and two young were killed further upstream at Wiseton (SK/7089) on 28th August 1844 (Hatfield, 1866).

In 1929, referring to otters in the Babworth region, Whittaker (1929) noted 'a few are at Bellmoor (SK/6984) and Tiln (SK/7084) where they use the land drains as earths and are occasionally hunted'. The *Doncaster Gazette* (1959) reported sightings of an otter at Bawtry (SK/5692) in 1953 and another at the confluence of the Idle and Ryton (SK/6591) during the first week of December 1959. This specimen was allegedly carrying a water vole (*Arvicola terrestris* (L.)). The species had evidently declined in the lower Idle Valley sufficiently for the press to regard these reports as highly newsworthy and to canvass (evidently unsuccessfully) for further records.

They were known in the Mattersey (SK/6989) and Clayworth areas between 1968 and 1972 (Scott, 1972) and footprints were found by the Idle at Seaftworth (SK/6691) in 1970 (Dunston, 1975).

*Chesterfield Canal*

An adult and two cubs were seen on the Chesterfield Canal near Clayworth (SK/7287) in 1972 (Scott, 1972). On 14th February 1996, when much of the canal was frozen, an otter was observed by crowds of onlookers and photographers catching fish in open water beneath Woodcock's Bridge in Retford. A photograph of the specimen on a ledge beneath the bridge appeared in the *Retford Times* 15.2.1996.

*River Ryton*

The churchwardens' accounts for the parish of Worksop (SK/5-7-; 5-8-) show that bounty money was paid for single otters in 1644 (White, 1904) and 1689, for three otters in 1699 and for two in 1749 (*Notts. Weekly Guardian* 19.9.1903). The forty-one otter bounties paid between 1697 and 1737 (White, 1904) show that during the late 17th and early 18th centuries the average cull in this parish was about one a year. In the parish of Blyth (SK/6-8-) payments for three otters' heads were made in 1720.

Referring to the closing years of the 18th century, Miller (1804) affirmed that otters frequented the Ryton between Blyth and Serlby (SK/6-8-). In 1875, streams in the northern parts of the Dukeries that feed into the Ryton system were known to be visited occasionally by otters (White, 1904; Carr, 1906).

In the early 20th century, otters still inhabited the Ryton's middle reaches, being present in two localities in the Worksop region (SK/5-7-; 5-8-) during 1903 (Nottingham Natural History Society, 1904; Carr, 1906).

An undated and unascribed press-cutting evidently referring to the 1930s describes otters occurring in the 'Canch', an ox-bow of the Ryton near Worksop. Also, under cover of darkness otters would fish under the bridge which crosses the Ryton in the centre of Worksop (SK/5879), residents from local households hearing their 'musical call notes' through the small hours and watching them swimming by moonlight (W. Doubleday, small quarto scrapbook, I p. 181).

In September 1910 the Buckinghamshire Otter Hounds under the mastership of Mr Uthwatt, met at Blyth Mill and quickly located two otters at Blyth Bridge (SK/6287). One was pursued upstream to Blyth (probably Langold) Lake (SK/5786) and the other downstream and was killed (*Doncaster Gazette*,1910). Hunting trophies examined in the process of this study (a mounted head on display at Carlton Mill and a mounted paw on sale at a Doncaster antiques fair) demonstrated their continued presence during the late 1920s. The trophy inscriptions showed that in 1928 the Buckinghamshire Otter Hounds made a kill at Carlton Lake (SK15883) on 3rd August and on the 5th August a 26 lb specimen was killed on the Ryton at Scrooby (SK/6591) (Howes, 1987). During the 1946 visit to Bawtry by the Buckinghamshire Otter Hounds, Mr J. P. Camm, one of the many local residents who followed the hunt, noted two otters 'drawn' from Serlby Park Lake (SK/6389) (Camm, 1975).

Referring to the early 1950s, Hyde (1952) was also aware of sites in the Serlby area and in the Ryton catchment downstream from Retford. In June 1975 a group of otters, allegedly consisting of two adults with up to four young, was watched on the Ryton near Blyth (SK/6287) (Guelder, 1975).

*River Roche*

On the Roche, a limestone tributary of the Ryton and once regularly hunted by the Buckinghamshire Otter Hounds, Bramhill (1952) reported seeing tracks during most winters up to 1951 in the silted culvert at the north end of Roche Abbey Lake (SK/5498).

*River Poulter*

Churchwardens' accounts from the parish of Elkesley (SK/6-7-), near where the Poulter, Meden and Maun join to form the River Idle, show that bounties were paid for otters' heads in 1706 (1), 1707 (2), 1708 (2) and 1711 (2). In 1930 an otter was shot by Mr Alfred Hawkes on the banks of a tributary near Cuckney (SK/5570) and was exhibited for a day outside Hancock's village store (Warren, 1994).

The Buckingham Otter Hounds regularly worked the Poulter but ceased in 1965 after the Vicar of Elkesley refused the hunt access to six acres of riparian land, aniseed trails were laid along the river and protests were made by senior members of the RSPCA regarding otter hunting on National Trust property at Clumber Park (*Yorkshire Post* 2.8.1965).

During the 1960s otters were known to breed in the vicinity of the ford at Hardwick Grange (SK/6375) in Clumber Park. Feeding was noticed upstream in the ornamental lake system and in the river Poulter downstream of the A414 (T) (SK/6575) (Lewis, 1993; Warren, 1994). In 1967 a specimen was found dead in Clumber Park Lakes (SK/6375), and in 1974 a specimen was watched further up the lake system at Welbeck (SK/5674) (Whiteley & Whiteley, 1976).

*River Meden*

On the Meden system near Thoresby Country Park Lake (SK/6370), two cubs were seen on several occasions during 1977, playing near a dead tree which was probably their natal holt (Warren, 1994).

*River Maun*

Churchwardens' accounts for the parish of Ollerton (SK/6-6-) show that bounty money was paid for two otters in 1707. According to the Duchess of Newcastle, prior to the 1st World War, the river at Clipstone Park (SKJ5-6-) was 'full of fish and otters' but she deplored the

area's subsequent destruction (Firth, undated), presumably due to the development of collieries at Clipstone and Edwinstow.

*River Trent*

Churchwardens' accounts for the parish of Farndon (SK/7-5-) near the confluence of the Trent and Dove, show that bounty money was paid for single otters in 1806 and 1809.

During the 19th century the shallows at the foot of Clifton Grove (SK/5435) used to be pointed out as a previous habitat for otters (*Notts. Weekly Guardian,* 19.9.1903).

In 1874 two otters, regarded as a great rarity, were disturbed by dogs from what was described as a 'nest' at Averham weir near Retford. The larger otter fought off the dogs and escaped into the Trent but the smaller 'cat-sized' specimen was captured alive (*Newark Advertiser*, 1874; *Nottinghamshire and Derbyshire Notes and Queries*, 1897; *Notts. Weekly Guardian,* 19.9.1903).

Carr (1906) noted that contemporary records from the Trent were 'fairly numerous' quoting examples of sightings or captures at Clifton (SK/5435) (several), Colwick (SK/6139), East Stoke (SK/7550), Farndon (SEV7-5-), South Collingham (SK/8061) and Wilford (SK/5637). Whitlock (1895) noted that an otter killed at Wilford had been exhibited in a local fishmonger's shop.

At the large disused gravel pits at Attenborough (SK/5-3-) to the south of Nottingham, an adult otter was killed by a local farmer in 1953 (Sharp, 1995) and a specimen was watched during 1973 on the same wetland, now a nature reserve (Warren, 1994). In spring 1974 one was seen near West Burton power station (*Retford Times*, 1996). The most recent record adjacent to the Trent was of an adult male 3' 2" in length killed on the road at South Muskham in 1995 (SK/7958); the specimen is now in the Nottingham Natural History Museum at Wollaton Hall (Sharp, 1995; *Nottingham Evening Post*, 26.8.1995).

*Otters Elsewhere in Nottinghamshire*

*River Devon*

The only evidence was of a spraint found in the boathouse at Knipton Reservoir about 1970-72 (Lenton *et al.,* 1980).

*Fairham Brook*

Two otters claimed to have been seen by a farmer in Fairham Brook (SK/5636) in about 1976 (Lenton *et al.,* 1980).

*Grantham Canal*

On 3rd March 1905 a specimen measuring 3' 11" in length was shot in the canal at Hickling (SK/6929). The specimen was placed in the Nottingham Natural History Museum (Carr, 1906).

*River Greet*

In December 1895 a male otter weighing 34 lb was shot in the river Greet at Upton (SK/7354) (*Notts. Daily Express,* 7.12.1895), the press article noting that 'these animals are now becoming very rare in the district, though they were frequently met with in the neighbourhood of the little river Greet, well known to anglers for its excellent trout fishing.' The Buckinghamshire Otter Hounds, based at Southwell, regularly worked the Greet and a photograph of their visit in September 1937, showing a river, fringed with pollarded willows, meandering through pasture land with woodland nearby, demonstrated the suitability of the Greet as an otter habitat (*Notts. Weekly Guardian,* 4.9.1937).

*River Leen*

During the early 1880s otters were known to have inhabited the willow beds on the River Leen at Basford (SK/5443) on the north-western edge of Nottingham and an otter trapped nearby in Aspley Woods (SK/5342) earlier during the 19th century was in the collection of Mr Lockwood of Aspley Hall (Carr, 1906).

*River Soar*

Along the River Soar, Whitlock (1895) reported one otter near Stanford-on-Soar (SK/5421) about 1869 and an extremely large male near Zouch Mill (SK/5023) about 1890. He also gave an account of a 'lair' on an island in the Soar frequented in November 1894 by 'two old otters and two more young ones' and that 'four more old and two young' were seen in the same place in August 1895. Large numbers of the swan mussel *(Anodonta cygnea)* located on the bank at this site were alleged to have been gathered and eaten by otters (Roebuck, 1896).

*River Wink*

Near Winkburn (SK/7158) in 1977 one was flushed from a badger sett on the river bank and killed by a gamekeeper (Warren, 1994).

## Discussion and Conclusions

*Data Sources*

Table 1 shows that regional histories and topographical works formed the most productive information sources, particularly for records up to the first half of the 19th century. Although having the advantage of ease of access, usually being standard works in local history libraries, their information is usually in review form, therefore lacking potentially significant associated detail. In reality the most prolific data source were archives in the form of churchwardens' accounts. Although only appearing to have produced 15.8% of the total records, in fact all 70 of the pre-19th century records (42.4% of the total records) were originally from this source. This discrepancy is due to the impressively productive series of accounts of the Worksop churchwardens not being available to current researchers. Were it not for historians (*Notts. Weekly Guardian,* 1903; White, 1904) publishing elements of their contents, which included allusions to some 45 otters, this data would have been entirely lost.

For the first half of the 19th century, regional histories and topographies again provided the most productive secondary and tertiary data source. For the second half of the 19th century, scientific literature, largely in the form of field notes in *The Naturalist*, provided some 42% of that period's data. Though precis of this data are more conveniently available in faunal reviews in local histories and topographies published at the turn of the century (e.g. Carr, 1906) these tend to be incomplete and lack potentially significant detail. The somewhat depressed number of records for the first half of the 20th century, representing only 8.5% of the total, may well have been an artefact of the two World Wars when the numbers of potential observers was much reduced and when society had other priorities. The second half of the 20th century, while including a major otter population 'crash', produced 20.6% of the total records. Here, proximity of time gave the advantage and published sources were more easily located. However, far more significantly, 62% of records for this period were obtained from unpublished personal recollections, a source barely available for earlier periods.

In undertaking this type of data search one traditionally resorts to the local scientific literature with its advantages of critical accuracy and a well indexed and consistant format. Although qualitatively proving a highly significant source, it only produced 12.1% of the total records. Interestingly, records from the press, while being vastly more laborious to trace, are worthwhile representing 17% of records. Curiously, the natural history fraternity were more likely to forward records to the scientific literature, whereas the general public and sporting fraternity generally communicated with the press.

*Status Changes*

This study has located evidence of otters on the following rivers and canal systems in Nottinghamshire for the following dates or date periods (see also Appendix 3): Fairham Brook (1976); Greet (1895 to 1937); Idle (1706 to 1980s); Leen (1880s); Maun (1707;

1920s); Meden (1977); Poulter (1706 to 1974); Roche (1951); Ryton (1644 to 1975); Soar (1869 to 1895); Trent (1806 to 1995); Wink (1977); Chesterfield Canal (1972 to 1996); Grantham Canal (1905).

Since bounty money was paid at all for otters from the mid-17th to the early 19th centuries and at the relatively large sum of 1 shilling per head, there is a presumption that otters were sufficiently numerous in certain riparian parishes to be regarded as significant pests.

The relatively low number of records from all sources located for the first half of the 19th century (only 9.7% of available records) may be a reflection of a low availability of suitable published outlets at the time. It may however be indicative of genuine scarcity, since several allusions were accompanied by references to rarity or absence. Also, in the adjacent river systems of South Yorkshire, allusions to local scarcities during this period were associated with high levels of persecution in the interests of preserving fish and game (Howes, 1976).

Otters were evidently 'fairly numerous' again by the end of the 19th century (Carr, 1906), and Stevens (1957) showed that in the mid-1950s most rivers associated with the Trent were sport-hunted and said to be well stocked with otters. The national, organochlorine (insecticidal seed dressing) related, population 'crash' of the 1950s and 1960s evidently depleted populations, particularly in the lowland, largely arable eastern counties of England (Chanin & Jefferies, 1978; Strachan & Jefferies, 1996). Although the identification of this crisis was not to become common knowledge until the late 1970s, the species was already being perceived as rare enough on the lower Idle system by 1959 to warrant an appeal for sightings (*Doncaster Gazette,* 1959) and was regarded as 'uncommon' throughout Nottinghamshire by 1966 (Halton, 1966).

Although extinctions undoubtedly occurred, otters appear not to have been totally eradicated in the then reasonably pastoral and wooded catchment of the Idle and Ryton in the northern extremities of the Dukeries. Otters were still in evidence, if seldom recorded, during the 1960s, 1970s and evidently up to the mid-1980s, with two well publicised records in the 1990s.

The three national sample site surveys (Lenton *et al.,* 1980; Strachan *et al.,* 1990; Strachan & Jefferies, 1996) failed to detect evidence of a surviving population; however, individual otters may have been present but too sparse to be detected by that methodology. Evidently female otters, particularly those rearing young, seldom produce spraints on land, so otter surveys dependent on spraints as field signs are therefore only likely to monitor for the presence of males (Strachan & Jefferies, 1996). Since the so called 'otter population crash' of the 1950s, and 1960s this review has located some 13 post-1970 records indicating at least sporadic presence on some eight water courses. Encouragingly, four sightings involved more than one specimen and three records indicated at least initially successful breeding.

This review was undertaken to provide information for use in a range of English Nature, Environment Agency and Local Authority conservation and land management strategies. The Environment Agency, in instigating otter surveillance and riparian habitat modification in the river Idle catchment has already taken a lead in these initiatives (Environment Agency, 1996), with actions currently including the provision of otter sprainting sites at suitable locations; undertaking surveys for otter movements; encouraging bank-side scrub cover; constructing four otter holts and ensuring that fyke nets (fish traps) are monitored for the use of otter guards.

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APPENDIX 1

Success rates in locating otter bounty records in churchwardens' accounts for 31 target riparian parishes in Nottinghamshire

| Parish | Appropriate date range | Vermine bounties | Otters bounties |
|---|---|---|---|
| Bawtry | * | * | – |
| Blyth | * | * | * |
| Bothamstall | * | – | – |
| Clayworth | * | * | * |
| Clifton with Glampton | – | – | – |
| Cromwell | – | – | – |
| Elkesley | * | * | * |
| Everton | * | * | – |
| Farndon | * | * | * |
| Gamston | * | * | * |
| Grassthorp | – | – | – |
| Gringley on the Hill | * | * | – |
| Holme Pierrepont | * | * | – |
| Lanham | – | – | – |
| Mattersey | – | – | – |
| Misson | * | – | – |
| Misterton | * | * | * |
| Newark | – | – | – |
| North Wheatley | – | – | – |
| Ollerton | * | * | * |
| Radcliffe on Trent | – | – | – |
| Ranby | – | – | – |
| Retford | – | – | – |
| Scaftworth | – | – | – |
| Scrooby | * | * | – |
| South Wilford | – | – | – |
| Sutton cum Lound | – | – | – |
| Walkeringham | – | – | – |
| West Drayton | – | – | – |
| West Stockwith | – | – | – |
| Worksop | * | * | * |
| **Total** | **15** | **13** | **8** |
| % of 31 Parishes | 48% | 42% | 26% |

APPENDIX 2

Bounty payment records for otters in the churchwardens' accounts of some Nottinghamshire riparian parishes

| Parish | Entry | Bounty payment £. s. d. |
|---|---|---|
| Blyth (PR/2795) | | |
| 1720 | Paid for three Otter heads | –. 3. –. |
| Clayworth (PR/5232) | | |
| 1677 | For four fumard* heads and one Otter head | –. 1. 8. |
| Elkesley (PR/190/1-82) | | |
| 1706 | Pd. to Thomas _____ for a Otter head | –. 1. –. |
| 1707 | Pd. for two Otters heads | –. 2. –. |
| 1708 | to John Hill for 2 Otter heads | –. 2. –. |
| 1711 | for 2 Otter heads | –. 2. –. |
| 1712 | Pd. to Thos. _____ for an Otter | –. 1. –. |
| 1723 | Paid for an Otter catching | –. 1. –. |
| 1724 | for an Otter head | –. 1. –. |
| Farndon (PR/21,778) | | |
| 1806 | Pd. for a Otter | –. 1. –. |
| 1809 | Pd. Henry lamb for a Otter | –. 1. –. |
| Gamston (PR/4216 & 584/6) | | |
| 1706 | Paid Mr Mustors for an Otter | –. 1. –. |
| Misterton (PR/1302) | | |
| 1696 | Paid Wm. Hardy for a Otter head & 5 fumard heads | –. 2. 6. |
| 1708 | for 4 Otters+ | –. –. 8. |
| Ollerton (PR/240) | | |
| 1707 | Paid for two Otter heads | –. 2. –. |
| Worksop | | |
| 1644 | For an Otter head and a Fox head (White 1904) | –. 2. –. |
| 1689 | Paid for 4 Foomards, one Fox and 1 Otter | –. 2. 8. |
| 1699 | Paid for 3 Otters heads | –. 3. –. |
| 1749 | For 9 Wild Cats, 2 Foxes, 5 Martens, 2 Otters and 23 Fumers (*Notts. Weekly Guardian* 19.9.1903) | 1. 1. 10. |
| 1697 to 1737 | 445 Fumards, 2 Badgers, 41 Otters, 6 Martens, 41 Wild cats and 362 Foxes (White 1904) | |

*Fumard and fumer = polecat, stoat or weasel for which 2d was paid.

+Since only 2d per specimen was paid for otters in this case, this may be evidence of a family of otter cubs being caught.

APPENDIX 3

Chronologieal evidence of otters on Nottinghamshire river and eanal systems

| Water | 17th Century | 18th Century | 19th Century | 20th Century pre-1960s | post-1960s |
|---|---|---|---|---|---|
| Chesterfield Canal | – | – | – | – | 1972; 96 |
| Fairham Brook | – | – | – | – | 1976 |
| Grantham Canal | – | – | – | 1905 | – |
| Greet | – | – | 1895 | 1937 | – |
| Idle (below of Bawtry) | 1696 | 1708 | 1832; 38 | – | 1980s |
| Idle (upstream of Bawtry) | 1677 | 1706 | 1804; 32; 44 | 2929; 53; 59 | 1970; 72 |
| Leen | – | – | 1800s | – | – |
| Maun | – | 1707 | – | Abundant | – |
| Meden | – | – | – | – | 1977 |
| Poulter | – | 1706; 7; 8; 11 | – | 1930 | 1967; 74 |
| Roche | – | – | – | 1951 | – |
| Ryton | 1644; 89; 99 | 1720; 49 | 1804; 75 | 1910; 28; 30s; 46; 50s | 1975 |
| Soar | – | – | 1869; 90; 94; 95 | – | – |
| Trent | – | – | 1806; 9; 74 | 1906; 53 | 1973; 74; 95 |
| Wink | – | – | – | – | 1977 |

# YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1996

Edited by R. COMLEY, J. PAYNE and K. G. PAYNE

## Booze in Arkengarthdale (VC65) 18th May (Deborah Millward)

The first Y.N.U. field meeting of thc year eame after a long eold winter and a late spring. A eold wind was blowing aeross the hillside above Langthwaite where we parked on arrival. However there was shelter in thc valleys by Arkle Beck and Slei Gill. The fact that the party eould only record 5 butterflies (1 Small White, 1 Peacock and 3 Small Tortoiseshells), provided evidenee of the recent bad weather in this upland region. At thc meeting, unusually, we had an areheologist among our number. Also, unusually, members arriving early for the indoor meeting were able to wateh a display of Morris Daneing. Mr Albert Hcnderson reported a quite remarkablc abundanee of rabbits in one area of the valley side. It was so riddled with burrows that the ground collapsed when walked over.

Flowering Plants (Deborah Millward)

Arkengarthdale in the region of Booze was still suffering the twin onslaughts of the previous year's drought followed by a prolonged snow lie and very late spring. The only plants flowering in any profusion were *Erophila verna* and *Primula vulgaris*, though a few warm days would find the banks of *Luzula sylvatica* and *Hyacinthoides non-scripta* looking spectacular. A wet flush in the woodland was colonised by intermingled *Chrysosplenium alternifolium* and *C. oppositifolium*.

Away from thc shelter of the river bank woodland the pastures had barely started growing, with *Viola lutea* extremely sparse and only *V. riviniana* well advanced. On the lead-mining spoil *Thlaspi caerulescens* was flowering virtually stalkless and only the tips

of *Minuartia verna* were showing green. *Botrychium lunaria* croziers were just visible but on the higher limestone rocks *Asplenium trichomanes-ramosum* was fully unfurled. Searches amongst the heather for previously recorded *Trientalis europaea* were plainly premature as the *Eriophorum vaginatum* flowers were only just turning yellow with pollen. However, two other old records were confirmed: *Thalictrum minus* and *Draba incana* were still growing on crags of the Windegg Vein, and about the rocks below *Saxifraga hypnoides* and *S. granulata* were growing with *Cochlearia pyrenaica.* Two members who headed west and recorded in the adjacent 10 km square also found the *Thalictrum minus;* additional plants of note were *Juniperus communis* and *Aphanes inexspectata,* the Slender Parsley-piert, a much under-recorded species.

Mollusca (Adrian Norris)

The circular for the Y.N.U. visit to Booze near Langthwaite in Arkengarthdale described the village as being 'a dry village'; if the reader will excuse a well-known saying, "many a true word is spoken in jest". The area was indeed dry and the heritage of last year's long drought followed by a cold dry winter was reflected in the low numbers and variety of mollusca found. Compared with a similar visit to the area on 19th May 1974 when 36 species were found, a total of 20 on this occasion was very poor. The visit was most notable for the absence of any of the larger land mollusca, and the lack of common roadside pest species. It might have been expected that the unusually dry conditions would have affected the slugs more than the snails and yet 6 out of the 20 species found were slugs, one indeed, *Limax Limax maximus*, being a new record for the area. With the addition of this slug, plus the common freshwater snail *Lymnaea peregra* which was found in the Arkle Beck, the combined list for the 10 km square now stands at 44 species.

Coleoptera (R. J. Hunt)

The coleopterists made their way from the car park down the road towards Langthwaite, sieving a few rabbit corpses whilst doing so. This produced only one common carrion beetle, *Thanatophilus rugosus.* Turning over numerous stones on the way was completely unproductive but considerable numbers of the small pollen beetle *Meligethes aeneus* were to be found in the Daffodils growing in the gass verge.

After crossing the bridge over Arkle Beck, a pile of decomposing straw was found which looked more hopeful. Sieving this produced the common Carabidae, *Pterostichus madidus*, a *Calathus* sp., and a few Staphylinidae. Along the woodland path were found two common ladybirds, the Seven and Fourteen spots. Another dead rabbit near the pond and marsh area yielded *Philonthus cephalotes* and *Philonthus puella.* In and around the pond itself were found the water beetle *Ilybius fuliginosus* and two Chrysoimelidae, *Phaedon cochleariae* and *Psylliodes cuprea.* Two Carabidae, *Bembidion tibiale* and *Agonum albipes* were located on the side of the stream.

Fungi (Ken Payne)

The most spectacular specimen was a single Morel, *Morchella esculenta*, collected by D. Millward. The writer spent the day by the Arkle and recorded 5 'rusts': *Phragmidium fragariae* (1) on *Potentilla sterilis, Puccinia chaerophylli* (1) on *Myrrhis odorata, Puccinia violae* on *Viola riviniana, Puccinia tumida* (3) on *Conopodium majus*, and *Uromyces ficariae* (3) on *Ranunculus ficaria.* The only smut found was also on celandine, *Entyloma ficariae.* It is a white 'smut' with spores embedded in the leaves, giving the leaves a pronounced mosaic effect.

Lichens (A. Henderson)

Most of the day was spent on the slopes and in the valley of the Slei Gill area. Exploration of the old mine tips was disappointing in producing no true metallophyte species. Most striking on the outcrops were large white thalli of calciphiles such as *Aspicilia calcarea* and *A. contorta*, contrasting with jet-black *Placynthium nigrum* and dark brown coats of

*Verrucaria nigrescens*. A medley of *Cladonia* species was scattered liberally over the terrain, dominated by *C. portentosa, C. furcata, C. subulata, C. diversa, C. pyxidata* and *C. chlorophaea*, frequently with an intermingling of the tiny squamules of *Agonimia tristicula*, which was also common on shaded soil and decayed humus and moss deposits. *Peltigera rufescens, Collema tenax* and *Leptogium turgidum* were met with frequently. The lower valley slopes west of the stream were unforgettably rabbit-pocked, often collapsing under one, but the plentiful rabbit-dung failed to yield other than common *Cladonia* species and indeterminate pycnidia of a *Bacidia*-like species. Although the area investigated produced no rarities, it nonetheless provided an intriguing day in the field.

Birds (M. J. A. Thompson)

In spite of a cold, northerly wind, this proved to be a very successful field day for observing birds, which were not only present in good numbers, but also in variety, with 47 species being recorded. It was pleasing to record that most of the species that the author of this report had recorded over twenty-five years ago were still present in and around Booze Wood. Within the wood a variety of small birds were seen, with some males in full song and defending territories. Notable amongst them were a male redstart *Phoenicurus phoenicurus* located in the upper north-west corner of the wood, two pairs of robins *Erithacus rubecula*, a male blackcap *Sylvia atricapilla* and a male tree pipit *Anthus trivialis* along the eastern edge. The wood warbler *Phylloscopus sibilatrix* usually present here most years was not seen nor heard, but a largeish unidentified yellow warbler seen could have been this species. However, there were several male willow warblers *Phylloscopus trochilus* to be seen and heard, along with a male Whitethroat *Sylvia communis* holding a territory on the wood's southern boundary. There were several Mistle thrushes *Turdus viscivorus* about.

A single woodcock *Scolopax rusticola* was accidentally flushed, and flew about in an agitated manner suggesting it was incubating eggs. No attempt was made to locate the nest of this wader, which nests most years in Booze Wood. The cuckoo *Cuculus canorus* was heard on two occasions. Other recorded woodland species included tree creeper *Certhia familiaris*, spotted flycatcher *Muscicapa striata*, a male great spotted woodpecker *Dendrocopos major*, wren *Troglodytes troglodytes* and a nuthatch *Sitta europaea*, the latter being common but local in VC65. Tits recorded in Booze Wood were great tit *Parus major*, blue tit *Parus caeruleus*, coal tit *Parus ater* and the long-tailed tit *Aegithalos caudatus*.

Along the Arkle Beck and Slei Gill other birds observed included dipper *Cinclus cinclus*, ring ouzel *Turdus torquatus*, wheatear *Oenanthe oenanthe* and yellow wagtail *Motacilla flava*. Birds of prey seen were a single sparrow hawk *Accipiter nisus* and a pair of buzzard *Buteo buteo* being mobbed by curlews *Numenius arquata*, the latter appearing to be well established in the area. It was exciting to see the buzzards, for, as a bird of prey, they have a tenuous hold in Yorkshire due to persecution. Not all bird species recorded have been described in this report, such as the game birds, crows and the swallow and finch families.

Mammals and Lower Vertebrates (M. J. A. Thompson)

The only mammal seen during the day was the rabbit which was present in good numbers, and a ready source of food for several predators, including the buzzards. Pine cones nibbled by the grey squirrel were found within the wood. Moles, judging by the number of mole hills, were well established in the vicinity of Booze Wood. Field vole runs were found in open grassland areas, and one was seen within a run. A few owl pellets were collected along the northern edge of Booze Wood, and besides containing the elytra of a species of dung beetle, also contained the lower jaws of two wood mice. The only evidence of another mammal species was that of roe deer when some fresh droppings were found within the wood.

Under some stones next to a derelict lime kiln situated between the eastern boundary of Booze Wood and Slei Gill, two mature slow worms were found. Judging from their sizes,

one was older than the other, and their presence indicated that there was a viable population of these reptiles in the area. A mature common lizard was also found. The sexes of neither species were determined. Initially, because of the cold conditions, they were very sluggish in their reactions. In the small pond below the wood, fed by a small spring, common frogs and two first year palmate newts were trawled out using nets to catch aquatic beetles. There used to be a small pond, situated next to a small market garden below Booze Wood, in which the palmate newt was very common. In 1971, 20 of these newts were removed by the author and put back immediately, but sadly, today, this pond had almost dried up.

**Blacktoft Area (VC61) 1st June (P. J. Cooke)**

A bright day with a cold wind typified the weather established throughout April and May, making one of the latest spring seasons to the recall of the more senior of more than 40 people attending this excursion. All met at the Hope & Anchor Inn and then split into groups to various publicly accessible habitats along the Humber bank westward towards Yokefleet, eastward to Faxfleet and the Market Weighton Canal, northward along road verges towards Gilberdyke and the railway station and north-westward towards the Goxford tile factory. A further group visited a disused brickpond at Newport. All re-assembled as the guests of the landlord of the inn for food, refreshments and room space for the ensuing meeting under the chairmanship of Mr Les Magee. At the end of reports, Mr Roy Crossley proposed a vote of thanks to the organiser.

Flowering Plants (Donald R. Grant)

With a large number of botanists being present, members divided up into small groups to give a wide coverage of different areas in the 10 km square SE82 to provide records for the new *Plant Atlas of the British Isles*, which is to be published for the Millenium. Members walked along the northern shore of the Humber estuary from Blacktoft to Yokefleet. The flood banks are sown with agricultural grasses and this gave rise to a limited flora. There was, however, a very small salt marsh near Yokefleet which had several of the maritime plants. The sward was composed of *Puccinellia maritima*, *P. distans,* and *Juncus gerardii*. *Bolboschoenus maritimus* grew in the wet muddy edges of small creeks. Drier parts had *Spergularia marina* and *Apium graveolens*. A roadside verge at Yokefleet had several plants of *Primula veris*. There were the usual weeds of cultivation in the arable fields, one having a large amount of *Alopecurus myosuroides*.

After lunch the area adjacent to Gilberdyke railway station was examined. There were many xerophytic plants provided by the old boiler ash and ballast around the railway lines. *Arabidopsis thaliana*, *Arenaria serpyllifolia*, *Vulpia bromoides*, *Aira caryophyllea*, *Cerastium semidecandrum* and *C. glomeratum* were in quantity. On some chalk ballast there was a colony of *Catapodium rigidum*. In the hedgerow were *Rubus eboracensis* and some naturalised *Sorbus intermedia*. In Blacktoft village the brickwork of the drainage dyke bridge was the home for *Parietaria judaica*. From the pond at Faxfleet, *Ceratophyllum demersum* was reported. In the ditch at Green Oak, *Iris pseudacorus* and *Carex acutiformis* were growing with *Filipendula ulmaria*. With the season being very late no pondweeds were seen. Some members visited the fishing pond area at Newport and reported seeing *Atropa belladonna*, *Ophrys apifera*, *Dactylorhiza fuchsii* and *D. praetermissa* and hybrids.

*Addendum*

A total of 245 vascular plant species were noted for SE82 – a magnificent effort considering the lateness of the season. Many thanks to Messrs Don Grant, Richard Middleton, John Newbould and Geoffrey Willmore and friends for collating lists for their groups (PJC).

Plant Galls (David P. Savage)
Twelve galls were found, several of which were in the early stages of development. All had been recorded in the vice county previously. However, several galls of *Andricus lignicola* were found on the planted oaks. This gall has spread into the estuarine area of the East Riding more slowly than, for example, in the West Riding where oak woodland is common. A total of four gall wasps were seen on the oaks and all were last year's galls. No fresh galls were seen. The common Currant Galls of *Neuroterus quercusbaccarum* were absent despite the abundance of suitable catkins on the oaks.

Coleoptera (Robin J. Hunt)
The morning was spent at a small pond and on the river bank in the Faxfleet area in GR 85.24. The pond contained the water beetles *Hyphydrus ovatus, Hygrotus inaequalis* and *Halilpus* species. Because of the strong wind, little attempt was made to use a sweep net. In searching under stones on the river side and in flood debris, several species of Carabidae including the common *Nebria brevicollis*, *Loricera pilicornis* and the small *Bembidion minimum* were found. The latter can be common in saltmarsh areas. It was here that Mr Len Aukland found a rather nice Carabidae, *Clivina collaris*.

After lunch the area around the canal and Broomfleet ponds was visited in SE 86.28. Working along the pond side and taking samples with a water net produced a variety of water beetles including *Gyrinus marinus, Laccophilus minutus, Hygrotus versicolor, Graptodytes pictus* and *Ochthebius minimus*. The brickyard pond in the same square was also investigated and found to contain the water beetles *Nebrioporus depressus* and *Hyphydrus ovatus*, the latter being found in all the areas worked during the day. A dead swan was sieved, producing two examples of *Leiodidae*, *Catops fuliginosus* and *Catops grandicollis*. Some Histeridae species were also found, together with a number of small Staphylinidae. Beating Hawthorn bushes on the canal bank produced the common Cerambycidae, *Grammoptera ruficornis*. A pleasant and productive day was had by all the Coleopterists present.

Birds (Ray A. Eades and P. J. Cooke)
The reed beds along the Humber bank eastwards towards the Market Weighton canal held healthy breeding populations of Reed Warblers, Sedge Warblers and Reed Buntings. Meadow Pipit were seen feeding fledged young, this species taking advantage of the area's permanent grassland offered by the Humber bank and saltings. The Meadow Pipit is becoming a largely coastal species in VC61 for this reason. Other notable species seen were Common Whitethroat, three pairs of Skylark and three Turtle Doves. Notable for their absence were Song Thrush, House Sparrow and Tree Sparrow in various habitats where they were likely to be seen. A pit at Faxfleet was an excellent area for wetland species with Pochard, Mute Swan with cygnets and young Coot. Seen in flight were one Black-tailed Godwit flying west up the Ouse, two Avocets flying over to Blacktoft Sands RSPB reserve and a female Marsh Harrier. Red-legged Partridge were common in the fields but no Grey Partridge were seen. It was notable that the Middle Whitton Sands were now a substantial island with established saltmarsh flora. A hundred Shelduck including one large youngster were seen feeding there. The song of a Redshank was heard on the wind.

**Yearsley Moor, Ampleforth (VC62) 6th July (J. M. Blackburn)**

Twenty-five members assembled at Redcar House before dispersing into the gounds of Ampleforth Abbey and College, with the kind permission of the Procurator. The weather, despite a mixed forecast, remained fine and dry during the day. Most members spent the morning in the area of the three ponds, which included some very wet alder and birch carr. The higher ground was dominated by coniferous woodland, relieved on its margins by deciduous species. In the afternoon several groups examined the more open ground north of the road between Redcar House and Gilling. Here a small pond proved a great attraction,

close to which was Holbeck and an old railway track which was very profitable.

The tea and meeting were held in the village hall at Gilling, attended by representatives of 23 affiliated societies. The President, Mr. A. Henderson, chaired the meeting. Following the reports, Mr. Adrian Norris proposed a vote of thanks, in particular to the Procurator of Ampleforth Abbey and College and the Trustees of Gilling village hall.

BRYOPHYTES (I. M. BLACKBURN)

The morning was spent working round the large lower pond including the drier wooded slopes, followed by an investigation of the wet alder and birch carr. The ground flora of the wooded banks contained acidic species and included *Campylopus introflexus*, *Dicranella heteromalla, Dicranum majus* and *D. scoparium. Isopterygium elegans, Mnium hornum, Plagiothecium undulatum*, *Pseudoscleropodium purum* and *Rhytidiadelplhus squarrosus.* The more shaded banks had *Calypogeia arguta, C. muelleriana* and *Lophozia ventricosa. Calliergon cuspidatum* was abundant at the pond margin.

The wet ground in the carr produced *Sphagnum auriculatum var auriculatum, S. palustre, S. squarrosum, Amblystegium riparium, Plagiomnium undulatum and Aneura pinguis,* and the calcicole *Cratoneuron commutatum* var *commutatum* in the flowing water. Epiphytes found in the carr were *Dicranoweisia cirrata, Orthotrichum affine, Bryum capillare, Dicranum scoparium, Plagiothecium curvifolium* and much *Tetraphis pellucida* and *Lepidozia reptans*. An interesting moss also seen here was *Dicranum tauricum.* This plant was rare in Britain until about 1930 but has increased since then, particularly in air-polluted areas. The limestone higher up the wood produced the calcicoles *Leiocolea badensis* and *Pellia endiviifolia.*

The afternoon was spent in more open ground to the north of the lower pond. The soil by a small pond contained several common *Barbula* species and the grassland had the. calcicole *Brachythecium glareosum.* Rocks in Holbeck produced *Rhynchostegium riparioides* and *Pohlia carnea*. A stubble field by the Redcar House track near Gilling was very rewarding with *Bryum bicolor, B. rubens, B. violaceum, Dicranella schreberana, D. staphylina, Phascum cuspidatum, Pottia truncata* and *Riccia sorocarpa.* The best find however was *Bryum ruderale* with its beautiful bright violet papillose rhizoids, growing in the trampled soil at the field entrance, a typical habitat for this moss. There are only a few scattered records for this plant in the vice county but it is probably under-recorded.

This was a very satisfying day with a total of 85 species recorded.

FLOWERING PLANTS (D. R. GRANT)

This area of the Howardian Hills is situated on the Jurassic series of rocks. These consist of sandstones which have small calcareous pockets. They give rise to acidic soils but here and there small pockets of limy soils occur. Park Wood is mainly conifers but there are some old deciduous trees. There are three ponds and the highest one has a large marsh at its inlet. The sedges *Carex acutiformis* and *C. rostrata* form extensive beds around these ponds. In the marsh there were *Hydrocotyle vulgaris, Crepis paludosa, Equisetum fluviatile, Juncus acutiflorus, Dryopteris carthusiana* and a colony of *Dactylorhiza fuchsii.* The middle pond had *Scutellaria gallericulata* and *Scrophularia auriculata*. Pondweeds were represented by *Potamogeton natans* and *Myriophyllum spicatum.* A colony of *Eupatorium cannabinum* was reported from one area. The woodland had much *Ceratocapnos claviculata* and the rides had *Carex binervis, C. pilulifera* and *Rubus dasyphyllus.*

Several members visited the old railway line and found *Silaum silaus, Rhinanthus minor* and *Chaenorhinum minus* in the open areas. Near the old railway a new pond had been constructed. This had marginal plants of *Iris pseudacorus, Sparganium erectum* and *Schoenoplectus lacustris.* In the water were *Potamogeton natans, P. berchtoldii* and *Callitriche hamulata*, together with a stonewort, *Chara vulgaris.* The pond banking had several colonies of *Daucus carota*. Roadside verges had *Rubus warrenii, R. echinatoides, Stachys officinalis* and *Stellaria graminea.* From two calcareous areas, *Hypericum hirsutum* and *Briza media* were reported.

LEPIDOPTERA (JOYCE PAYNE AND J. A. NEWBOULD)

In spite of the rather dull day, it is surprising that 10 species of butterfly were reported. These were mainly seen near the disused railway. Large Green-veined White and Orange Tip were in low numbers. Meadow Brown and Ringlet were the only "Browns" noted. Large and Small Skipper were seen, as also was Common Blue. A single Painted Lady was seen and a worn Peacock was flying. Larvae of this species were also present.

Towards the end of the day in Park Wood, geometrid moths started emerging from their hiding places. Riband wave, Silver-ground Carpet, Green Carpet, Foxglove Pug, Brown Silver-line, Clouded Border, Scalloped Hazel, Mottled Beauty, Common White Wave and Light Emerald were seen mostly as singletons, though Common White Wave was observed 6 times and Silver-ground Carpet 4 times by the writer. Chimney sweepers were reported from the grassy area on the edge of the wood where its food plant, Pignut, was growing.

Only two noctuids were seen – a single Hart & Dart and a Silver Y. In spite of using the net for light sweeping on ground vegetation and tree foliage, not a single lepidopterous larva was found. Also recorded was the micro-moth *Stigmella aurella* on Bramble as a laval mine. Dr Tannett located the micro-moth Thistle Ermine (*Myelois cribrella*), and *Chrysoteuchia culmella* was frequent in grassland in the afternoon. Two China-mark moths, Brown China-mark (*Nymphula nymphaeata*) and *Parapoynx crisonalis* were recorded from the new pond to the north. In the Alder woodland the nettle feeding micro-moth *Udea olivalis* was recorded.

COLEOPTERA (R. J. HUNT)

The bulk of the collecting by the coleopterists took place in and around the three ponds in the area known as Park Wood. Beating hazel near the large pond produced the weevil *Strophosoma melanogrammum* and by random sweeping in the same area we found the click beetles *Athous haemorrhoidalis*, *Agriotes pallidulus* and *Dalopius marginatus*. Three species of *Haliplus* water beetles were found in the same pond and in the overflow channel an Elmid species was found clinging to the underside of a stone. The marsh ladybird was common in the lakeside vegetation and *Scirtes hemisphaericus* was also present.

Lunch was taken in a small clearing under some large pine trees where the small Carabidae, *Bembidion lampros* was found amongst the pine needles. Afterwards we made our way through the Alder carr towards the second pond. Sweeping vegetation through the woodland ride gave us the two and fourteen spot ladybirds and turning over logs produced the large Caridiidae, *Abax parallelepipedus*. Several small beetles were sieved from a polyorous fungus from a Silver Birch tree. At the second pond, Dytiscidae, *Illybius fuliginosus* and the whirlygig beetle *Gyrinus substriatus* were netted. Further sweeping in the area produced the ladybird *Aphidecta obliterata* and the Chrysomelidae, *Prasocuris junci* which inhabits Brooklime. Sweeping the sides of the rides on the return to the car park we collected good numbers of *Malachius bipustulatus* and a small Staphylinidae, *Stenus flavipes* was taken as it ran across the pathway.

At the meeting in the village hall the botanists handed over a Cerambycidae beetle, *Rhagium bifasciatum* which they had found in the disused railway line area.

BIRDS (S. PASHBY AND P. CLAYDON)

The 28 species noted by the recorders during the day were augmented to 35 species at the indoor meeting. Interesting sightings on the lakes were Great Crested and Little Grebes, Gadwall, Canada Goose and Heron, along with the more common water species. The woods had a good representative selection and included Gold Crest, Nuthatch, Tree Creeper and Goldfinch, as well as three species each of tits and warblers.

FUNGI (C. S. V. YEATES)

The writer spent the morning exploring the wet woodland and swamps around the lowest pond. After lunch the hedges, banks and fields along the lane to Gilling were worked. On the Y.N.U.'s visit to this area in August 1951, the late Willis Bramley collected the ascomycete *Pleospora scirpicola* on dead stems of *Schoenoplectus lacustris*. It was also

very common on this occasion, and is likely to be found wherever its host plant occurs, although there is only a handful of records. Other ascomycetes with few records included *Phragmoporthe conformis* on *Alnus* twigs. *Taphridium umbeliferarum*, a parasitic species which causes swelling and distortion of *Heracleum* leaves, appears to be a V.C. meeting specialism, most of the few previous records having been made on such occasions. These have all been on meetings close to the coast and had led to the writer to think that in Yorkshire at least it is a species with a strongly eastern distribution. Its find here – some 45 km. from the coast – clearly modifies this theory, but it does appear to be absent from the western half of the county. Mycology is sadly still in its infancy as regards our understanding of these matters and further fieldwork is required.

The rust *Puccinia chaerophyllii* is quite a common fungus, usually found wherever *Myrrhis odorata* occurs. Rather strangely it is much less common on the native *Anthriscus sylvestris* on which it was recorded here, by the lane from Gilling to Redcar House. Much more exciting was David Savage's find of a rust new to the county. This was *Puccinia fergussonii* on *Viola palustris*, the only violet species on which it occurs in Britain. The rusts have been well worked in the county for over a century and only five taxa have been added since *A Fungus Flora of Yorkshire* (1985) so this was an exceptional find.

Among the "imperfect" fungi (now called mitosporic fungi) several species with few or no previous Yorkshire records were found. *Ramularia* species form tufts of conidia on the undersides of dead or dying leaves of a wide variety of plants. In general these are differentiated by their host relationships. There is, therefore, a lot of scope for new records for a group in which only Mr Bramley undertook any serious study until relatively recently. With this in mind it is always worth carefully examining "new" host species. On this occasion *R. anthrisci* on *Anthriscus sylvestris* was added to the county list. It was, in fact, found in three separate 1 km. squares – underlining the fact that these fungi are very much under-worked. The dematiaceous hyphomycete *Monodictys lepraria* was found on damp *Ilex* wood and was also new to the county. The coelomycete *Ascochyta viciae* was a second Yorkshire record and was new to the vice county.

The writer is grateful to Messrs M. W. Sykes, A. Norris and J. A. Newbould for bringing several species to his attention. In all some 86 species were found, including "toadstools" and a number of bracket fungi, a highly satisfactory total, with some quality finds. Voucher material of some of the more notable collections mentioned above has been lodged at Leeds City Museum.

LICHENS (A. HENDERSON)

The expanse of woodland from Park Wood onto Yearsley Moor was not rich at all in lichens, only about 40 quite expectable species being recorded on a variety of habitats. Most interesting of these, perhaps, was the pycnidiate micro-species, *Micarea botryoides*, on the bases of a few trees near the ponds. *Dimerella diluta*, another shade-lover, with waxlike white-ochre fruits was occasional in older tree crannies and on shaded boles. The list for the day was augmented to 60 species just before teatime by a quick recording of the common assemblages growing on and around the school.

## Ilkley (VC64) 20th July (Joan E. Duncan)

The field meeting at Ilkley took place 50 years after the previous outdoor meeting there in 1946. For the Wharfedale Naturalists' Society (founded in October 1945) this was the final event of the Golden Jubilee celebrations and members were pleased to entertain the YNU. Copies of a sketch map were available showing a number of locations to choose for investigation. The day was sunny and hot; owing to the drought, the River Wharfe was very low, a feature noticed with concern by several of the visitors. Refreshments and the report meeting were held at the Ilkley campus of Bradford and Ilkley College. The president of WNS, Margaret Paine, was invited to chair the meeting. 17 affiliated societies

vere represented. Joyce and Kenneth Payne and Joan Duncan had also attended the 1946 meeting. Albert Henderson, YNU president, thanked the WNS for their hospitality.

FUNGI (AUDREY GRAMSHAW)

There were very few records not surprising in the dry conditions. *Pleurotus ostreatus* (Oyster Mushroom) was found on dead Elms in Heber's Ghyll and also from Middleton Woods on the other side of the valley. *Pleurotus cornucopiae* and *Phallus impudicus* were found in Hudson Wood and *Panaeolus rickenii* from Addingham Moorside.

Kenneth and Joyce Payne contributed the following records: *Polyporus squamosus* was found on a tree stump in Denton churchyard. The following rust fungi were found: *Melampsora caprearum* on *Salix caprea* in the College grounds, *M. hypericorum* on *Hypericum calycinum* (Rose of Sharon) in Denton churchyard, *Puccinia chaerophylli* still apparent on *Myrrhis odorata* by the River Wharfe, *P. lapsanae* on *Lapsana communis* near Middleton Woods, and *P. punctiformis* on *Cirsium arvense*.

LICHENS (A. HENDERSON)

As the moorland lichens are comparatively well explored (150 species from the 10 km square [NGR 44/14]), it was decided to concentrate on the small village of Middleton and the riverbank by the footbridge [NGR 44/122484] and cemetery south of the river. The 50 species recorded were comparable with the rural-suburban flora encountered in most suburbanised/agriculturalised areas subject to the influence of motor traffic, nitrogenous enrichment and dust contamination; so that *Phaeophyscia nigricans* on the top of a small gravestone could be considered the most notable lichen find of the day! On the wider botanical front, however, an unexpected horticultural pleasure deserves mentioning: a mature chimaera of *Fagus sylvatica* var. *sylvatica* x *F. sylvatica* var. *heterophylla*, a genetic miscellany cross between the common and the fern-leaved beech, at the hub of the cemetery pathways by the chapels [NGR 44/122483].

VASCULAR PLANTS (D. R. GRANT)

The Ilkley area is situated on the millstone grit series of rocks which are represented by coarse grained sandstones, shales and clay. There are some glacial deposits, as at Lanshaw Delves, where the influence of lime can be observed. Rombalds Moor is a large area composed of Heather, Bilberry and in recent times much Bracken. There are several small streams running down from the moor top and these have small marshy areas along their sides. Sedges were represented by *Carex echinata*, *C. binervis*, *C. pilulifera*, *C. panicea* and *C. viridula* ssp. *oedocarpa*. Very wet areas had *Potamogeton polygonifolius* and *Narthecium ossifragum*. The ferns *Blechnum spicant* and *Oreopteris limbosperma* abounded along the gill sides. The woodland areas towards Addingham Moorside had large stands of *Ceratocapnos claviculata* and a patch of *Gaultheria shallon*. A marsh in the area had a colony of *Myosotis stolonifera*.

The River Wharfe was very low due to the extraction of water for drinking at Lob Wood, Addingham. There were vast areas of shingle exposed which had *Rorippa sylvestris*. On the shady banks there was much *Myrrhis odorata* .and *Campanula latifolia*, and small colonies of *Allium oleraceum* and *A. scordoprasum*. The presence of limestone pebbles in the river banks allowed calcicoles *Galium verum* and *Rubus vestitus* to flourish.

The roadside to Beamsley yielded many brambles, the interesting ones being *Rubus warrenii* and *R. echinatoides*. Hudson Wood (part of Middleton Woods) is the home of the rare sedge *Carex strigosa* and has a ground flora of *Circaea lutetiana* with *Stellaria nemorum*. Brambles are represented by *Rubus dasyphyllus*, *R. newbouldii*, *R. sprengelii* and several colonies of the rare *R. sciocharis*.

COLEOPTERA (R. J. HUNT)

The morning was spent in the area around Middleton Village, where sweeping the roadside verge gave us the two, seven and fourteen spot ladybirds and one Cantharidae, *Cantharis*

*nigra*. A few Meligethes species were beaten from Elder trees. Searching under stones in a roadside pasture produced numbers of a very common Carabidae, *Pterostichus madidus*, including a gravid female.

After lunch we paid a visit to the riverside but fared little better there. The Carabidae, *Elaphrus riparius* was found running on a muddy area as was an unidentified species of Helophrus. Near the sewage station, *Amara aulica* was found under stones and *Bembidion tibiale* frequented areas of the river bank. The weevil *Zacladus geranii* was swept off a *Geranium* species growing near the river bank. Before the end of the day, a short visit was made onto the moorland behind the college, where we found two species of Elateridae (click beetles), a two spot ladybird and a Carabidae, *Agonum fuliginosum* under a boulder.

LEPIDOPTERA (JOYCE PAYNE)

Meadow Brown and Small Skipper were the only butterflies seen in good numbers but owing to observers visiting meadow, riverside and moorlands, 11 species were reported altogether. These were Large, Small and Green-veined White, Ringlet, Meadow Brown and Small Heath; Small Tortoiseshell and Painted Lady; Small Copper and Large and Small Skipper. Two geometrid moths were seen, Chimney Sweeper and Common White Wave. Three members of the noctuidae were noted, Large Yellow Underwing, True Lover's Knot from the moor and Silver Y. A member of the primitive family Zygnaenidae, 5-spot Burnet was reported. The True Lover's Knot is a heath and heather feeder and so originally confined to the moorland areas but it has started to occur in more diverse habitats and is thought to breed in cultivated heath gardens; nevertheless I have never seen it in the Lower Ouse or Wharfe valleys in my 50 years of observation or 14 years of light trapping.

BIRDS (M. DENSLEY)

The main search for birds took place along the River Wharfe from the old bridge in Ilkley to Addingham village, and the records from here were augmented by parties of other disciplines working at Ben Rhydding gravel pits (alongside the Wharfe), Middleton Woods and elsewhere in the area.

Late July is always a quiet time for birds. The breeding season is essentially over, the adult birds are moulting and in hiding, there is little song and migation has not yet started. However, thirty-one species of bird were recorded during the day, perhaps the most noteworthy being a pair of Kingfishers which appeared to be still feeding young, probably still in the nest, at Addingham (another single bird was also seen at Ben Rhydding), and three, probably non-breeding female Goosanders on the river. The latter species now breeds quite commonly on the Wharfe (and other Dales rivers), having colonised this part of Yorkshire since the early 1970s. Formerly it was merely a regular winter visitor from Scotland, and possibly Scandinavia, to a number of reservoirs and other fresh water sites in the county. Other typical riverside species to be expected here were Heron, Oystercatcher, Sand Martin and Pied and Grey Wagtails. Dipper was not seen, but is known to occur.

Other species recorded were: Mallard (*c.* 50 birds, including two females each with two well grown young), Kestrel, Sparrowhawk, Moorhen, Curlew, Black-headed Gull, Common Gull, Woodpigeon, Swift, House Martin, Swallow, Wren, Dunnock, Song Thrush, Blackcap, Willow Warbler, Long-tailed Tit, Blue Tit, Great Tit, Jackdaw, Carrion Crow, Chaffinch, Greenfinch, Goldfinch.

## Wath-upon-Dearne (VC63) 10th August (J. R. Comley)

On the journey to the meeting start, most people travelled through a tremendous rainstorm, but this ceased just prior to the field meeting, the ground dried rapidly and the rest of the day was warm and fine. The meeting was well organised by Nick Sellwood, Phillipa Harvey and Sue Perry of Rotherham's Amenity and Recreation Countryside Management team, the sites being owned by Rotherham Borough Council. The morning was spent in the Warren Vale area which has developed from its industrial past into a varied landscape of

extensive rough grassland bounded to the north by valley woodland, Birch Wood, and a feature called Roman Ridge which presented a dry shale bank. In the south, the land sloped down through scrub and bands of trees to a mire with a small pool shaded by willows.

After lunch, the meeting moved north east to Wath Wood, which adjoins Boyd Royd Wood in such a way that the boundary between the two is all but indiscernible. This has been a neglected plantation woodland that is now being managed. The central area has lately been coppiced (felled leaving the stumps) and a healthy crop of spring flowers has been reported for 1995 and 1996. Some members paid a quick visit to Creighton Woods which are a strip of woodlands adjoining extensive housing. A common bird census was done by Mr P. Bowler in Birch Wood (16 species) and Warren Vale grassland and scrub (26 species) in 1994 and in Wath Wood (7 species) in 1995. This area, previously under-recorded, has recently become well recorded and is proving remarkably diverse in habitat and species.

### Vascular Plants (D. R. Grant)

The area visited is situated on the coal measures series of rocks which are mainly sandstones and shales, giving rise to acidic soils. The Warren Vale area, examined in the morning, supported a coal mine and other industrial works in the late 1800s. The soil is very thin and there are areas of bare shale. The short turf had *Danthonia decumbens* and *Hieracium vagum*. A piece of relic ridge and furrow grassland had *Listera ovata*, *Sanguisorba officinalis* and *Leucanthemum vulgare*. Brambles were frequent and were represented by *Rubus lindleianus*, *R. vestitus*, *R. warrenii*, *R. newbouldii* and *R. echinatoides*. Mr N. Sellwood listed 66 species in Birch Wood including *Tilia cordata*, which was rare here, frequent *Hyacinthoiodes non-scripta*, *Dryopteris dilatata*, *Galium odorata*, and in a streamside marsh at the western end of the Birch Wood *Phalaris arundincaea*.

In the afternoon members visited Wath Wood. The ground in the wood was very barren over large areas due to Beech trees and Birch scrub. Other areas were covered with *Rubus dasyphyllus*, *Milium effusum* and *Claytonia sibirica* were the only unusual plants. There were colonies of *Fallopia japonica*. On the nearby roadside were *Puccinellia distans* and *Lactuca serriola*. A quick look at Creighton Woods revealed a colony of *Rubus rufescens*, an indicator of ancient woodland. The two ponds were surrounded by trees and had no vegetation. *Rubus nemoralis* was the only species of note in this area.

### Lepidoptera (Joyce Payne)

By the time we left the car park at Warren Vale, the sun had broken through after a torrential rain storm and insects were flying again. The newly emerged imagos of the June migration of Painted Ladies were the most noticeable butterflies on the flowery areas of Creeping Thistle; most of them were feeding. They gave a magnificent display, surpassing any I have seen in my 50 years of observation either in the north or south of England or in Europe. When feeding voraciously, this butterfly flits from flower to flower, giving a perpetual wave-like illusion, but rarely leaving the group. Red Admiral, Peacock and Small Tortoiseshell were among the Painted Ladies in very small numbers. Gatekeeper and Meadow Browns were the most numerous "Browns" and Ringlet was reported. Large, Small and Green-veined Whites were all seen, but the total was exceedingly low. A single, immaculate Clouded Yellow seen at Warren Vale had apparently bred locally. Small Copper and Common Blue were present in low numbers and a few Small Skippers were seen.

Warren Vale was far richer in Butterflies than Wath Wood. Even so, 11 species were recorded in the clearings and the lane below the wood. Painted Ladies were feeding on a rough area outside the wood, disappearing when the sun went in. When it reappeared, it was interesting to see them descend immediately from the high trees on the wood edge and resume feeding. In all, 14 species of butterfly were recorded at the two sites.

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